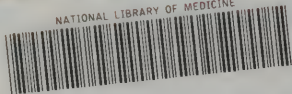


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A TREATISE

ON

THE BREAST

AND ITS SURGICAL DISEASES.

—BY—

HOMER I. OSTROM, M.D.



PHILADELPHIA :

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P R E F A C E .

The following Treatise on the Breast and its Surgical Diseases, was written for the *American Journal of Homœopathic Materia Medica*, and appeared in part in the closing numbers of that periodical, which were issued May, June, July and August, eighteen hundred and seventy-six. The consolidation of the *American Journal of Homœopathic Materia Medica* with the *Hahnemannian Monthly*, was consummated in December of the same year, and necessitated a change in the method of publishing this Treatise. Without altering the original plan of the work, the serial character of which excluded much valuable material, it is offered to the profession in its present form.

New York, 1877.

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A T R E A T I S E

—ON—

THE BREAST,

AND ITS SURGICAL DISEASES.

PART I.—GLANDS IN GENERAL.

Glands possess certain characteristics by which they are distinguished from other organs. These are essentially :

1. They are originally closed sacs, formed by a prolongation inwards of the mucous membrane or skin.
2. Though amply supplied with blood, in no instance have the vessels been observed to communicate directly with the cavity of the sac—a thin membrane seems constantly to intervene.
3. Each gland is provided with an opening by which the secreted substance is excreted.*
4. Their function is to

*The only known exceptions to this are found in the thyroid body, the supra renal capsules, and the ovaries. The two former are sometimes called glands, though their functions are unknown. The latter are more truly glands, for at certain periods they open, and discharge the peculiar secretion of the ova.

separate from the blood a peculiar substance which is poured upon the surface of the body.

It has been shown by Rémark, following in the footsteps of Kölliker, that the outer and inner of the three layers of the germinal membrane of the normally developed embryo, are chiefly instrumental in producing epithelial tissue; therefore from these, glands are developed. At a certain point, an epithelial cell begins to divide; this process continues until an excrescence of epithelial cells is formed, which grows inwards. This expands in different directions until a sac, having a secreting surface continuous with an outer surface, is developed.

From the simplest form of gland—the mucous follicle—by a successive process of development, the most complicated gland tissue of the body is evolved. The great anatomist, Mickel, first suggested this truth, and more recently, German scientists—among whom may be mentioned Prof. Müller, of Berlin—have authoritatively confirmed that which he foreshadowed. Although extended research was necessary to declare positively in regard to this, the universal laws of evolution have greatly aided anatomists in their investigations. By these laws, we know that when any particular gland appears in the animal series, it is invariably of the simplest form of glandular tissue; and that in the higher classes, a gland corresponding to this may attain the most intricate formation; as an example, the salivary glands of birds are of the simplest construction; so, also, the pancreas of fishes, and the liver of insects.

Though in some glands, as the mammary, salivary, and lachrymal, a certain regularity is observed in the division of the secretory canals, this is quite exceptional; for the blood vessels, and other contiguous structures, offer obstacles to the uniform development of the original sac.

The epithelial structure of glands is spread as a thick covering over a basement membrane (*membrana propria*),

upon which the blood vessels ramify. J. Müller, whose researches upon this subject have been very thorough, says that in no instance do these vessels communicate directly with the cavity of the sac; they are arranged as a capillary net work on their walls, and in their interstices. It is, however, possible, especially when we consider the facility with which injections are passed from the capillary vessels into the canals upon which they ramify, that this view is too exclusive, and that in some instances, especially in the venous system, duct communications do exist between the gland and the blood supply. The vessels are divided to the most extreme degree of minuteness, thus affording the largest expansion of surface in the smallest space. The supply of blood is in proportion to the degree of activity of the gland, and not according to its size. This law prevails in all parts of the body, the brain and glands being the organs most liberally supplied with nutritive material. We notice this especially in the mammary gland during lactation, at which time the amount of blood determined to the part is greatly in excess of the supply at any other period. It is to be remarked that the veins, as compared with the arteries, are smaller than elsewhere in the body. This circumstance may receive an explanation in the fact, that glands extract or take from the blood certain materials, which, if conveyed to the other parts, would pass into the venous circulation; and thus may we not establish a certain ratio between the secreted substance, and the comparatively small amount of blood which is returned from a gland while in a state of activity? The smaller glands are generally supplied with blood by one artery. This, after entering the gland, divides into an infinite number of branches, which penetrate into the depths of the organ, and at length form a most delicate plexus upon its walls. Careful injections have demonstrated that the arteries ter-

minate in the returning veins. This fact caused Müller to say "that in no organ are the free extremities of the blood vessels seen; the arteries always pass by a reticular anastomosis into the veins." Kierman was led to the same conclusion from his examination of the circulation of the liver.

The basement membrane, upon which the spheroidal epithelial cells rest, is, in the best marked cases, distinctly homogeneous and transparent; but, in some instances, it has been found to be purely fibrous. Fibrous tissue is not found in the sac only, where several layers usually exist, but it is also traceable into the ducts. The contraction of this muscular fibre, together with the motion of the cilia of the cells, causes the secretion of the gland to flow out, often against its own gravity. Those fibres of muscular tissue which lie in immediate contact with the mucous tissue, Bowman asserts to be composed of longitudinal and circular fibres, the latter being generally the most internal. The smaller ducts do not possess muscular fibres; the epithelial structure rests directly upon the basement membrane.

The office of the *membrana propria* seems to be, in all cases, to support the epithelial structure; to give strength and protection to the gland, and also to form a surface upon which the blood vessels may ramify. Prof. Goodsire considers that this membrane is covered with points, termed centres of nutrition, from which the development of the epithelial cells proceeds. This seems to be corroborated by the fact, that the tissue possesses the power of regenerating the cells, after old ones have been cast off, or wasted in the process of secretion, but this is common to all tissues of the body.

The disposition of the lymphatics of glands is somewhat obscure. Cruikshank, Kierman, and others contended, founding their opinions upon original investigations, that communications existed between the ducts and the lym-

phatics. Müller, however, denies this, regarding such communications as fistulous passages, caused by rupture of the coat of the vessels. He furthermore states, that the lymphatics are much larger than the smallest secretory canals.

The nerves of glands are derived mainly from the system of the great sympathetic, and in number correspond to the size of the organ which they supply. The fibrils surround and accompany the arteries into the interior of the gland, until they become so minute as to elude observation. They in no instance separate from the vessels; and we may therefore conclude that their chief office is to regulate the supply of blood to the gland, and that they have little more to do with the activity of the gland cells, than indirectly to furnish them with their pabulum.

Cellular tissue exists in most glands to a considerable extent. It seems to be useful in filling up the fissures and angles that intervene between tubes and tubuli. The larger glands are supplied with a tough, fibrous capsule, or enveloping membrane, which adheres closely to the glandular tissue. The smaller glands seem to possess in its place a condensation of connective cellular tissue.

The ducts of glands in many instances are only distinguishable from the gland by their size. This we readily understand, when we reflect that the gland consists of many fine tubes with coecal extremities, which open into one or more larger tubes;—for the so-called *acini*, or grapes of Malpighi, do not constantly exist;—and also when we remember that the structure, epithelium, forms the inner covering of both gland and duct. In many instances, it is evident that the epithelium of ducts is the true secreting structure.

Secretion, strictly speaking, is confined to glandular organs. It is a process of cell growth, the essential characters of which are the position in which the cells are developed, and the disposition made of the product of their activity.

The true agents of secretion are epithelial cells, which, as we have seen, form an inner covering of the glands and ducts. The shape of these cells is not important, as circumstances, pressure, etc., may alter them in this regard. These cells possess the power of taking from the blood their proper pabulum. In this, they present no difference from other histological elements. But here the analogy ceases; for, while in the one case, all the pabulum taken up by the cell goes to the nourishment of the cell, and the production of formed material (cell wall)—in the other, with which we are at present especially concerned, not only is the cell maintained, but a certain portion of the pabulum taken into the cell, is there subjected to peculiar changes, which render it no longer recognizable as having existed in the blood. The fluid thus formed is discharged from the gland, either by a bursting of the cell wall, whereby it is carried away with a fluid suited for that purpose, or by exudation through the cell wall.

We have no evidence to support the theory that the active organs in secretion are discharged in the substance excreted. It is probable that there is no actual loss of cellular elements, but that in a certain sense, each cell is a gland, in which a peculiar substance is formed, and from which that peculiar substance is filtered. There is, of course, a natural disquamation of epithelial cells from the surfaces upon which they grow; and those cells which are cast off are renewed by new cells, but this process is much too slow to produce the secretions, for example, of the gastric glands or the mammary glands.*

Why one gland should secrete milk, another saliva, and still another bile, it is at present impossible to determine. But that this depends wholly upon some inherent quality of the bioplasm of the cell, admits of little doubt.

* "Disease Germs: their Nature and Origin." Lionel S. Beale, London. J. & A. Churchill. 1872.

Those physiological and pathological structures which have a permanent existence are generally provided with nuclei, and it is possible that these centres are connected in no indirect manner with the reproduction of the cell. All life is developed from centres, and so within the nuclei are nucleoli, "the whole process consists of evolutions from centres, and the production of new centres within pre-existing centres."*

We may further remark, that the nucleus, though a particle of living matter, sometimes surrounded by a delicate membrane of formed material, is not subject to those changes which are observed to take place in the mass of bioplasm in which it is situated. When the nucleus takes on the characters of a cell, which it is capable of doing under peculiar circumstances, its bioplasm presents no apparent differences from other bioplasms. This cannot be said of the living matter of the cell which surrounds the nucleus. This has been seen to change with the nature of the fluid secreted, nay, more, contains that material. Virchow says,† "within a smooth, muscular fibre cell, the contractile substance is deposited, which seems to be the seat of the contractile force of muscles; the nucleus, however, remains the same." And again: "Hence it follows, that the special peculiarities which individual cells exhibit in particular places, under particular circumstances, are in general, dependent upon the varying properties of the cell contents, and that it is not the constituents which we have hitherto considered (membrane and nucleus), but the contents, (or else the masses of matter deposited without the cell *intercellular*), which give rise to functional (physiological) difference of tissues."

* "Protoplasm; or, Matter and Life." L. S. Beale. Churchill, London, 1874.

† "Cellular Pathology." R. Virchow.

We may, therefore, assume that the bioplasm* possesses the power of taking from the blood its peculiar pabulum, and that the nucleus maintains the life of the cell, or, more properly, prevents cell annihilation, by division. Wherever there is life there is motion; and, regarding the phenomena of secretion, it probably depends upon a change of position, which has been observed to take place among the minute particles found within the bioplasm.

It is probable that the force with which the secretion of a gland is thrown out of that organ is not wholly due, either to the unstripped muscular fibres which are constantly found in the larger ducts, or to the contraction of the arteries with which a gland is supplied;—Ludwig has shown in his experiments on the salivary glands, that the pressure on the outward current of saliva is greater than the pressure of the inward current of blood;—but, in a large degree, depends upon the peculiar activity with which the secreting cells are endowed.

It has long been observed, that vital activity required for its production an irritation; and, furthermore, that this irritation is peculiar to the especial variety of activity displayed; so that the mammary gland cells, when the proper stimulus is applied, secrete milk, &c., &c. In opposition to the teaching of Haller, Virchow maintained that the sole stimulus was not invariably furnished by nerve agency, but was directly traceable to the motion of the cell; and this motion was caused by those elements of the blood which act upon that particular cell. When these are absent from the blood, the gland cells are inactive. Each cell, when in a state of health, can extract from the food its peculiar pabulum only; and thus the blood of a cell is not alone acted upon, but also stimulates the cell to a state of activity.

* The term bioplasm, as applied to the unformed matter, in contradistinction to the cell wall, is objectionable; for the reason that all the cell contents, with the exception of the occasional exceedingly delicate wall which surrounds the nucleus, is living matter. As, however, it is in general use, we will retain it in the present treatise.

PART II.—COMPARATIVE ANATOMY OF THE MAMMARY GLAND.

The presence in certain vertebrates of a gland, which secretes milk has given the name to the class Mammalia, in Natural History. Something similar to such an organ is found in birds, and, perhaps in some reptiles; a portion of the intestinal canal—the cup—undergoes changes analogous to those which occur in the mammæ at the breeding season, but which is not a special organ secreting nutritive fluid.

Peculiar brain conformation is connected in no indirect manner with the development of the mammary gland. Thus: in those Lyencephalous mammalia whose *corpora quadrigemina* are less definitely divided than in others, an absence of nipples has been constantly observed; furthermore, their cerebral hemispheres are connected only by the round and hippocampal commissures, and as a class they bring forth their young prematurely.

In the several classes of the order mammalia, the mammary glands differ in *number, situation, and form*. In the normal condition there are never less than two glands, and rarely more than thirteen, decreasing in number as we approach the highest sub-class of mammals, archencephela. Those animals which bring forth many young at a time, are provided with a corresponding number of nipples, these sometimes greatly exceed the number of glands. An exception to this rule is found in the common guinea pig.* These creatures not infrequently give birth to twelve young, though in no instance have they been known to possess more than ten nipples; the size of the gland, is enormous. The mammæ are generally furnished with one or more nipples, whereby the young are enabled

* Sixteen embryo opossums were taken from the uterus by Prof. Wilder. The mother had only thirteen nipples, so that three of the young must have perished.—*Popular Science Monthly*, D. Appleton & Co., New York, Jan., 1876.

to receive nourishment, but a notable exception exists in the *Ornithorhynchus*, a member of the order monotremata, in which there are no nipples. The mouth of the young *Ornithorhynchus* is so formed as to remove the inconveniences which would otherwise attend such formation. The mouth and tongue are broad, and the jaws soft, so that with the suction of the recipient, and the compression of the glands by the mother, the proper degree of nourishment is obtained. The power to compress the gland, and to force the lacteal fluid into the mouth of the young, is an important part of the process of suckling. For, in lowly organized mammals, the uterine product does not possess sufficient strength when born to draw the nourishment from its mother. Therefore, there is developed in the mature female the ileo marsupial muscle, "which arises from the ilium between or near the lower attachment of the internal oblique and transversalis abdominis; it passes out of the abdominal ring, bends round the marsupial bone,* and expands as it turns upwards and inwards behind the pouch to surround partly by carneous, partly by sclerous fibres, the mammary glands, dividing into as many insertions as there are glands of its own side. This muscle (ileo marsupialis of Cuvier) is the homotype of the cremaster in man."†

Another interesting deviation from the general formative type of the mammary gland, is found in the *Echidna hystrix*. The glands form long, flattened masses on the sides of the abdomen, and the ducts, when the organ is functionally developed, open into a small tegumentary pouch. Into this the mouth of the young *Echidna*, which

* These two particular bones attached to the pubis, and interposed between the abdominal muscles, support the marsupial pouch. They are not alone found in marsupials. "The Animal Kingdom." Baron Cuvier. New York. G. & C. & H. Carrill. 1831. Vol. I.

† "The Anatomy of Vertebrates." Birds and Mammals. R. Owen. Vol. II. London. Longmans, Green & Co., 1866.

has the form of a transverse slit, and is not circular, as in all true or teated marsupials, is inserted during the act of suckling.

The mammary glands in marsupials are compact, and developed on either side of the linea alba, at the back of a pouch formed by a reflection of the abdominal integument. The nipples vary in number, from two to thirteen, six on each side, and one midway (*Didelphys*). When in use they are long and slender, but until a few days before uterine birth, they are covered with a sheath derived from the integument of the abdomen, which resembles the prepuce in its relation to the glans penis. In the kangaroo, the nipple, after some weeks of use, presents a slight terminal expansion, which is received in a deep longitudinal fossa in the tongue of the young marsupial. The same is true of the *Virginia opossum*.

It is interesting to observe that the development of the marsupial pouch is in an inverse ratio to that of the uteri, and directly as that of the complicated *vaginæ*. Thus, it is rudimental in the *Dorsigerous opossum*, which has the longest uterus and the simplest vagina. We may conclude, therefore, that the young undergo a greater degree of development in the womb in this and allied species.

Exactly the manner in which the young marsupial is conveyed from the uterus, whence it is expelled prematurely, into the fold where it lives until sufficiently developed to take on an independent existence, has until recently been a matter for speculation.

It was thought by early naturalists that the young were developed from the parent's nipples, for those investigators could conceive of no method by which the seemingly inanimated object found within the pouch, and adhering firmly to the nipple, could have been conveyed there. But this theory can no longer be maintained. Mr. Owen observed a Kangaroo in the London Zoological Gardens in 1833: "The fore paws were not used for the transmission of the foetus, but to keep open the pouch, ready for its

reception, the new born animal being deposited therein, and so held over a nipple until the mother has felt it grasp the sensitive extremity of the nipple." Mr. J. G. Shutes' observations have led him to believe that, at least in some opossums, the transmission of the fœtus from the vagina to the pouch is effected by the mother bending her body, so as to bring the sexual opposite the marsupial orifice; and that the latter opens by muscular action to receive the young, without any assistance from the paws or lips of the female.*

It is further probable, that in those marsupials in which the mouth of the pouch is directed backwards (*Perameles* and *Chæropus*), the uterine product passes directly from the vagina into the pouch without the curving of the body of the mother, which Mr. Shutes witnessed.

The situation of the glands and nipples depends upon the habits and requirements of the animal. Thus, the mother *Coypii* carries her young on her back as she fords streams, and her teats project from the flanks nearer the back than the belly; the anterior pair are just behind the shoulders, and the posterior pair anterior to the haunches. By this arrangement, the young can easily obtain nourishment while on the back of the mother. In regard to the glands themselves, as an instance of the adaptation of the means to the end, may be cited the *Cetacea*. These creatures exist wholly in the water, rising only to respire, and to nurse their young. Their mammary glands are very large, but are developed in breadth and length, at the expense of thickness; so they do not project nor interfere with the requisite shape of the natatory animal. The glands are two in number, and situated near the anus. In the porpoise, the nipples are concealed in a cleft in the abdomen, one on each side of the vulva.

As we descend the scale of mammals, we find the lacteal organ less frequently situated upon the thorax than

* *Popular Science Monthly*, Jan., 1876. D. Appleton & Co., New York.

in the region of the genital organs. Neither do we observe that fulness which characterizes the breast in man. In the Aye-aye, a pair of nipples and glands, one inch apart, is situated about one inch and a half in advance of the vulva. In some kinds of Maki (*Lemur catta*), two pairs of pectoral nipples have been found. Mr. Owen has observed in the Ourang-outang an accessory nipple on the left side below the normal one, but smaller in size. In the elephant and dugong, the mammæ are situated between the fore legs, and the young animal compresses the gland with its trunk as it sucks. In the mare and ass the glands occupy a position about nine inches in advance of the vulva; in the tapir, they are inguinal. In all ruminants the glands are compacted into a pendulous mass, capable of division into two distinct organs; they have received the special name of "udders," and are also inguinal.

A resemblance has been traced between the scent glands of some animals, and the mammary glands; but this is wholly fanciful as to function, that of the first being to excite the sexual appetite;* and of the second to maintain the product of conception. These scent glands are commonly situated in the vicinity of the genital organs, and communicate with the surface of the body by a single duct, or many minute orifices. In the carnivora they are very well developed, each being provided with a muscular capsule. This gland does not exist in mammals only, in certain tropical bats a scent gland exudes upon the anterior border of the wing, near the head of the humerus.

The minute anatomy of the lacteal gland is substantially the same in all mammals.† The differences consist mainly

* These peculiar organs become the largest in the male shrew at the season of rut. In the *Ornithorhynchus* they are found only in the female, and conversely are small during the rutting season, but attain an enormous size after gestation:

† This will be considered in Part III. of this Treatise. "Anatomy of Human Mammary Gland."

in the proportional development of the parts which compose the organ. Thus, the lacteal tubes vary in number. In the cow and goat there is but one duct to each nipple; in the rhinoceros there are twelve. In marsupials generally, about six ducts enter each nipple. In the human subject, the lactiferous tubes are arborescent, but in some of the lower animals, there are reservoirs into which the milk passes. In the porpoise the milk tubes are very large, and are a substitute for such a reservoir. In the full grown mammary gland of the *Ornithorhynchus*, the ducts terminate in a large central canal from which the excretory duct is continued.

Of course, the blood supply must vary in origin, with the situation of the organ. In *Bimana* the blood is derived from the subclavian and axillary arteries mainly, but in other mammals where the gland is pubic or inguinal, the arteries spring from the epigastric; where ventral or pectoral, from the axillary, intracostal, internal mammary, lumbar, and epigastric. Sir A. Cooper remarks* that "the nerves differ in their distribution, but as to source, they obey one law, viz., that they are composed of the true spinal roots of the grand sympathetic nerves; and hence the ready sympathy which exists between the ovaries, uterus, and mammary glands."

PART III.—ANATOMY OF THE HUMAN MAMMARY GLAND.

The mammary glands are the organs of lactation. They exist in a rudimentary state in the male, unless excited by some peculiar or morbid condition—the loss or atrophy of the testes.† They are situated upon the anterior aspect of the thorax, between the skin and pectoralis major muscles; from the latter they are separated by a thin layer of superficial fascia. The base of each

*Anatomy of the Breast. Sir A. Cooper. London. Longmans, Orme, Green, Brown & Longmans. 1840.

†Instances are reported, in which men have successfully nursed infants, from their own breasts.

breast is slightly oval, the left a little larger than the right, and extends from the outer border of the sternum to the edge of the axilla, and from opposite the third to the seventh rib. Externally the mammæ, together with a considerable quantity of fat and the integuments, presents a convex appearance. A little below the centre, on a level with the fourth rib, is a conical projection, the nipple (mamilla), around which there is a colored circle (areola). In virgins the nipple and areola are a delicate pink, but after conception they assume a brownish hue, which deepens as pregnancy advances; this appearance is retained through life. Before puberty the breasts are small, and in a quiescent state, but at that period they enlarge, and become fitted when called upon to perform the function of lactation.

The skin which covers the mammæ is exceedingly fine, so that the superficial vessels may be clearly seen in their ramifications. In the structure and arrangement of their parts the lactiferous glands do not differ materially from the lachrymal and salivary glands, the liver and pancreas. They are composed of successively ramified secreting tubes, which open into common ducts. Each gland is divided into several lobes, distinctly felt through the integument. These lobes are made up of lobuli, which in their turn are composed of small glandiform masses—*acini*. The acini contain the ultimate glandular arrangements, and consist of small oblong vesicles united by a cellular substance. These are the beginning of the lactiferous ducts, and have a diameter from ten to thirty times as great as that of the capillary vessels by which they are surrounded. The lobes number from ten to twenty-five, and each one is provided with an excretory duct, into which the smaller lactiferous ducts open. The gland vesicles are round, or pyriform, and measure from $\frac{1}{240}$ to $\frac{1}{171}$ of an inch in diameter. They are composed of a structureless membrane, the *membrana propria*, upon which the spheroidal nucleated epithelial cells lie. This epithelium also lines the whole interior of the

structure, so that we may say, with Virchow, that glands consist of an accumulation of cells, which usually form open canals. The vesicles are held together by a dense, white areolar tissue, thus forming lobes; this tissue also connects the several lobes with each other, and forms a covering for the whole structure. The larger ducts of the gland, galactophorous, terminate externally in the nipple, where they open by minute orifices.

The nipple is composed of areolar tissue and smooth muscular tissue; the latter increases greatly during pregnancy. The cuticle covering the nipple is exceedingly fine, not more than $\frac{1}{2000}$ of an inch thick; the malpighian layer is thick, and contains much pigment; the coloring matter, however, is not so abundant in the nipple as in the areola. Externally the nipple is marked by numerous wrinkles and very small papillæ; internally the lactiferous ducts dilate at the base, to be again contracted near the apex. The nipple is capable of erection under external irritation, or certain mental conditions. Sir A. Cooper attributed this phenomena to the propelling forward of blood to the papillæ by the action of the heart, thus producing extreme congestion of the capillary arteries.* Mr. Birkett is rather disposed to believe that the so-called erection of the nipple is the result of the contraction of fibre tissue, and distension of the lactiferous tubes.†

The areola forms a circle around the nipple. It is smooth prior to puberty, but then little eminences and tubercles appear upon its surface. It is probable that these papillæ secrete a substance which, by lubricating the parts, prevents excoriation and injury from the mouth of the child; they have been known to pour forth true milk.‡

* "The Anatomy of the Breast." Sir A. Cooper.

† "Diseases of the Breast." John Birkett, London. Longman, Brown, Green and Longmans. 1850.

‡ "Physiological Anatomy and Physiology of Man." R. B. Todd and W. Bowman. Philadelphia. Lea and Blanchard. 1850.

With the other parts of the breast, the areola increases in size after puberty, when it becomes two inches or more in diameter. Sir A. Cooper considered the areola an extension of the nipple; their structures are similar.

The mammary glands are supplied very liberally with blood. It is mainly derived from the internal mammary, a branch of the inferior part of the subclavian artery and the axillary artery. The former sends three anterior branches, the latter two or three posterior branches. These anastomose and form a fine capillary net-work which surrounds the glandular vesicles. Smaller branches from other sources are not infrequently found. The veins arising from the papillæ of the nipple "form radii to an ellipse behind the areola at its margin."* From this ellipse four principal branches proceed to be distributed on the fore part of the breast, where they communicate freely with each other; they are more numerous and somewhat larger than the corresponding arteries. They terminate in the axillary, internal mammary, cephalic, external jugular and subclavian veins. The deep seated veins accompany the arteries, and after forming a superficial plexus under the skin, empty into the intercostal veins.

The nerves which supply the mammary gland have three points of origin: the anterior portion of the spinal cord; the posterior portion of the spinal cord; the great sympathetic nerve, which unites with the dorsal nerves at the ganglion formed by the junction of the first two mentioned branches. The direct spinal branches furnish motion and sensation, the sympathetic supplies the power of secretion.†

* "The Anatomy of the Breast." Sir A. Cooper.

† The exact manner in which nerves effect the process of secretion is not well understood. The light which modern science has thrown upon the properties of cells; the fact that the cell itself possesses the power to take from the blood that which it requires, militates against the theory that the nerves, *per se*, excite the gland cells to secrete. That they are intimately connected with the process of secretion is

All the dorsal nerves, as they reach the sides of the chest, divide into two branches, a direct or posterior, and a reflected or anterior branch. Of the former, only branches of the fourth and fifth pairs are distributed to the breast; they form a plexus around the nipple and areola. Of the latter, branches of the second, third, fourth, fifth and sixth nerves are distributed in the following manner: The second above the breast anastomoses with the second posterior branch; the third divides into two branches; one passes above the breast, the other accompanies the anterior branch of the internal mammary artery; the fourth also has two divisions, one supplies the base of the nipple, the other the upper and inner part of the gland; the fifth passes to the integuments at the lower part of the breast; the sixth is distributed below the gland. Prof. Müller could find no filaments from the sympathetic in the mammæ, but Sir A. Cooper and Mr. Birkett assert that a connection between that system and the lactiferous organ is established through the dorsal nerves. In some of the lower animals, for example the ass, the third lumbar ganglion of the sympathetic sends a large branch to join the external spermatic nerve, a great part of which is distributed on the mammæ. In animals in which these glands are situated upon the thorax, no such direct communication with the sympathetic system of nerves has been traced. Although it may be difficult to understand how such a communication is maintained through the dorsal nerves, it seems probable that the properties imparted to a ganglion may be transmitted by other nerves to a particular organ; and so, irritation in the uterus may be conveyed through the splanchnic nerves or the lumbar ganglia of the sympathetic, and from thence to the thoracic

plain, for if we destroy communication with the nerve centres, the organ is no longer able to perform its functions properly. May not the nerve cells excite secretion, *first*, by regulating the blood supply; and *second*, by preparing the blood in a peculiar manner for the use of the gland cells?

ganglia, which communicates with the dorsal nerves supplying the mammæ.

The absorbents of the mammary gland are exceedingly numerous, but they are not easily seen, unless during lactation. They are both superficial and deep. The first arise from the nipple and mucous glands of the skin, the second from the deep structures of the gland. The superficial absorbents are found largely upon the outer side of the gland. They proceed to the axilla, where, after entering two sets of absorbent glands, they form upon the second rib a long plexus, from which an absorbent trunk about the size of a goose quill arises. This terminates at the angle formed between the right jugular and right subclavian veins. On the left side the absorbents unite with the thoracic duct at the angle of the jugular and subclavian veins of that side. Besides these there are also others, which arise from the sternal side of the breast and terminate in the absorbents of the arm. The deep absorbents arise from the mucous membrane of the lactiferous tubes, and form a plexus in the centre of the gland. Two principal ducts are formed which enter the glands in the axilla, into which the superficial vessels empty. Frequent communications are established between the two sets of absorbents. In another part of this treatise we will speak of the relation which these vessels bear to the diseases of the breast.

PART IV.—MAMMARY SECRETION.

While *in utero* the foetus receives nourishment through fluids placed in contact with it, and through the placental vessels; but the changed condition of the offspring, following gestation, necessitates some other food for its support than that upon which it hitherto subsisted. This food must be easily digested, and contain in a pre-eminent degree all that will nourish the young organism. Milk, the peculiar secretion of the mammary glands, meets these requirements. At no period of man's existence is growth

so rapid and perfect as when he depends wholly upon the breast for support. It has been thought, therefore, by Prout and others, that milk must be the standard of food, "that it is a kind of prototype of the nutritious elements in general." But such deductions seem unwarranted, for we may feed children on milk and they thrive, but if we subject adults to similar dietetic rules, the result is quite the opposite. One cause of this is, the increased waste of tissue which generally accompanies advancing years. But if milk does not furnish an absolute standard of food, it furnishes an approximate standard of great value. For clearly, if the young require peculiar elements for their growth, in a certain degree the same may be said of adults, the difference is more one of quantity than of quality.

Milk does not attain its normal character before the third or fourth day after delivery. That which is secreted before parturition, colostrum, is thin, and contains but a small proportion of saccharine and oily material; its specific gravity varies from 1020 to 1045.*

The secreting action of the mammary gland is almost continuous after it has been once established, though there may be periods at which the milk is produced in greater abundance than at others. During the whole period of lactation, which varies from eight to twenty months, a large quantity of blood is furnished to the mammary glands, but especially is this true of that period embraced by the first few days which follow parturition. Then, as the uterus no longer requires blood for the support of the fœtus, an increased proportion passes to the breasts to furnish nourishment through the lacteal fluid. A continuous vascular supply is provided for by the suspension of the regular monthly flow during the nursing of the child. By use, within certain limitations, a part becomes stronger and more developed, and so, as lactation progresses, the breasts grow to a larger size and increase in functional activity.

* Physiological Anatomy and Physiology of Man. R. B. Todd and W. Bowman.

Milk is not always secreted by a slow and continuous production, but occasionally is found what is known among nurses as the "draught" of the breast. At such times a sudden rush of blood to the breast is noticed, during which milk is secreted in great abundance, and will sometimes spurt from the nipples with considerable force if not drawn by the child. The sight of the child will sometimes produce the "draught;" but probably the most efficient cause, is the application of the child's mouth to the nipple.

Of the manner in which the several properties of milk are secreted, we are still in ignorance. That they are produced in the gland *de novo*, and do not exist in the blood, as such, experiments have established. Thus, sugar of milk is peculiar to the mammary gland, and is not found in any other part of the organism, nor is its appearance in the milk influenced by injecting different varieties of sugar in the blood vessels of a living animal; neither is caseine found in the blood.* It is therefore evident, that the mammary gland possesses the power to manufacture new elements from those already existing. We have elsewhere referred to this matter.

The quantity of milk secreted varies according to circumstances. Sir A. Cooper† found, after many experiments, that the morning, was more profuse than the evening milk; he further stated that two fluid ounces can generally be drawn from a full breast. Lampérière made sixty-seven experiments, from which he concludes that from fifty to sixty grammes of milk were secreted in two hours. Lehmann, basing his calculations upon the same data, estimates that in twenty-four hours the average quantity of milk discharged is about 44.5 fluid ounces. If menstruation is established during lactation, the secretion of milk is greatly

* The Physiology of Man. Austin Flint, Jr. New York, D. Appleton & Co., 1870.

† The Anatomy of the Breast.

diminished; so also if pregnancy occurs. Lacteal secretion may be wholly arrested by fright—several cases of which are recorded by Sir A. Cooper and others; but, other things being equal, the supply will always be in accordance with the demand.

According to Vernois and Becquerel, milk has an average specific gravity of 1032.* When perfectly fresh the secretion is decidedly alkaline, but after standing a short time it becomes slightly acid; the latter change takes place more rapidly in cow's than in human milk. Milk does not coagulate by heat, but owing to the action of heat on caseine, a thin pedicle is formed on the surface. The small proportion of albumen contained in milk does not seem to be affected by the action of heat. When milk coagulates spontaneously, or by something acting upon its caseine, it separates into a curd composed of caseine a large proportion of fatty particles, and a yellowish green serum—whey. If the milk is allowed to stand for a short time exposed to the air, it separates into two portions; most of the globules rise to the top, forming cream, which has a specific gravity of about 1024. The heavier portion is of a bluish tint, and contains a very small proportion of the globules. Churning is probably accomplished by breaking the envelope, composed of caseine, which contains fat, and the oil globules are made to rise.

Cow's milk contains more caseine and less sugar than human milk, but human milk is much richer in butter than the former. The following table is compiled by Robin :†

COMPOSITION OF HUMAN MILK.

Water	. . . . .	902.717 to 863.149
Caseine	. . . . .	29.000 to 39.000
Lacto-proteine	. . . . .	1.000 to 2.770
Albumen	. . . . .	Traces to 0.880

* Vernois et Becquerel. *Du lait chez la femme*. Paris, 1853.

† Physiology of Man. Austin Flint, Jr.

Butter 25 to 38.	{	Margarine . . .	17.000 to	25.840
		Oleine . . .	7.500 to	11.400
		Butyrine, Caprine, Ca-		
		proine, Capsiline	0.500 to	0.700
Sugar of milk (lactine or lactose) .			37.000 to	49.000
Lactate of soda (?)			0.420 to	0.450
Chloride of sodium			0.240 to	0.340
Chloride of potassium			1.440 to	1.830
Carbonate of soda			0.053 to	0.056
Carbonate of lime			0.069 to	0.070
Phosphate of lime of the bones .			2.310 to	3.440
Phosphate of magnesia			0.420 to	0.640
Phosphate of soda			0.225 to	0.230
Phosphate of iron (?)			0.032 to	0.070
Sulphate of soda			0.074 to	0.075
Sulphate of potassa			Traces.	

1.000.000 1.000.000

Gases in solution.	{	Oxygen . . .	1.29	30 parts per 1.000 in volume.
		Nitrogen . .	12.17	
		Carbonic acid	16.54	

From this it will be seen that milk contains the three classes of organic principles which form the chief food of animals: albuminous, saccharine, and oleaginous, and also certain mineral compounds especially required by the infant organism.

The proportion of the constituents of milk is subject to variations, according to the nature of the food consumed, the exercise taken, the influence of medicinal agents, and certain mental conditions. Water seems to exercise a marked influence upon the mammary secretion, and it is generally in great demand during lactation. Many medicinal substances pass directly into the mammary secretion without undergoing any change, so that they may be administered to the child through the mother. Vernois & Becquerel mention the case of a woman who grieved greatly at the loss of a child who died from pneumonia.

The milk was much diminished in quantity, and in the proportion of salts, butter and sugar, but the proportion of caseine was increased.. It appears from the analysis of Simon that the proportion of the different elements is liable to variation, according to the time which has elapsed since parturition. At the commencement of lactation the quantity of sugar is at its maximum, but gradually diminishes, while caseine at that time is at its minimum and gradually increases. It has further been stated by Dr. Playfair that butter is diminished in an inverse ratio to the amount of exercise taken, but that caseine is increased.

The colostrum, which precedes the appearance of the true milk, is exceedingly important in its effect upon the child. It is a true purgative, and by its action is removed the meconium with which the bowels are loaded at birth.* The colostrum corpuscles which appear in milk during the first few days of lactation, are irregular conglomerations of fat granules with a diameter of from 1-2000th to nearly 1-500th of an inch, and have neither nucleus nor cell wall. They seem to owe their origin to a fatty degeneration of epithelial cells. This fact was first discovered by Reinhardt, but it was left for Virchow† to apply in detail the theory of the transformation of cellular elements to the milk globules. He taught that milk corpuscles were produced by the coalescence of the minute granules which appear in colostrum, and that the only difference between the formation of colostrum and milk corpuscles is that in the former fluid, the process goes on slowly, and the particles maintain their cohesion longer, "whilst in the secretion of milk, the process is acute, and the cells more speedily perish."

Colostrum contains more sugar and inorganic salts than milk, and the pure colostrum contains a larger proportion

* Principles of Human Physiology. W. B. Carpenter. Phila. Blanchard & Lea, 1862.

† Cellular Pathology. R. Virchow.

of albumen, which gives place to caseine. The following is an analysis of colostrum :*

Water	945.24 to 851.97
Albumen	29.81 to 80.73
Butter	7.07 to 41.30
Sugar of milk	17.27 to 43.69
Chloride of sodium	0.57
Chloride of potassium	1.25
Phosphates and sulphates of potassa, of lime, and of magnesia	2.96
Phosphate of iron	0.01
	4.41 to 5.44

Colostrum decomposes more rapidly than milk. In the normal condition milk contains no colostrum corpuscles after the fifteenth day of lactation, but it is an interesting fact that their appearance is almost constant when any abnormal condition disturbs the milk secretion.

A certain correspondence has been observed to exist between the quantity and quality of colostrum, and the subsequent secretions of milk. Donn  concludes, after many experiments, that when the colostrum is small in quantity, very little milk will be secreted after delivery ; so also when the colostrum is normal as to quality, but is poor in milk and colostrum corpuscles.

Milk corpuscles are found in moderate quantities in pure colostrum ; but as before said, are not in excess before the eighth or ninth day after parturition. With a magnifying power of from three to six hundred diameters they may easily be seen. They are highly refractive, and float or are suspended in a clear fluid. They have a diameter of from 1-2500th to 1-1250th of an inch, and are generally quite distinct from each other. It seems at present to be well established that the milk corpuscle is a true anatomical element ; that is, that the fatty and other materials of which it is made up are contained in a delicate membrane composed of caseine (albumen, Virchow), called

* Physiology of Man. Austin Flint, Jr.

by Anderson, *haptogenic* (produced by contact). The design of the present treatise will not permit a discussion of the experiments upon which this view is based. They are most exhaustive, and convinced such profound thinkers as Henle* and Mitscherlich, of the claim of the milk corpuscle to be considered an anatomical element. If it is not such, it seems difficult to conceive how it can so constantly maintain an individuality and avoid dissolution.

PART V.—ÆTIOLOGY.

At present, cells may be regarded as the ultimate parts of the body. By the multiplication of cells tissues are built up, and all physiological changes must be referred to cellular activity. Healthy nutrition depends upon a delicate adjustment between the receptive capacity of cells and the condition of the fluid from which cells extract their pabulum. When this harmony is disturbed, disease results. If the system affected is otherwise healthy, and the error in nutrition of slight importance, the diseased cells either recover, or are cast off, and their place supplied by new and healthy cells. But if these conditions are reversed, if the constitution is tainted by some inherited or acquired tendency, if the error in nutrition is of such a character as to require a length of time for its restoration, the cellular elements of the part retrograde in type, and, at least in the individual thus affected, rarely show any tendency to return to their normal condition.

That which determines the peculiar nature of cellular changes, is unknown. Possibly the blood contains certain elements, in, for example a cancerous condition, which elements being conveyed to cells capable of receiving them, there cause changes which result in the development of a cancerous growth. Possibly the nerves control cellular metamorphosis. Possibly the individuality and power of independent action which such cell possesses, may, under circumstances favorable to the exercise of that individuality,

* Henle, *Traité d'anatomie générale*. Paris, 1843. Tome II.

be able to determine a change in cell type. In point of knowledge, one conjecture should receive as much consideration as another, but in point of theory, perhaps the most weight attaches to that one which relates to the blood. For, though no other changes than such as pertain to a proportional alteration of its constituents have been detected in the blood of persons suffering from constitutional diseases,* we are not justified in saying that such do not exist; moreover, the blood is the great agent of nutrition, and contains that upon which cells live. It is probable that the three propositions which we have mentioned, and perhaps more should be mentioned, hold this complementary relation to each other, as regards health and disease. The cell as a unit of life, when relieved from the controlling influence which preserves harmony, which influence is conveyed to it, the cell, by means of the nervous system,† is capable of deteriorating, and incapable of resisting the deleterious influences to which it may be exposed. The blood containing the germs of disease,‡ as the nutrient fluid, passes to all parts of the system, and those cells, the resisting power of which is lowered, are readily affected by the diseased elements, and according to the nature of those elements, are converted into some one of the many forms of pathological cell life known in hist-

* Reference is not here made to diseased germs, which are found in the blood in many diseases. These are foreign bodies, and as such circulate in the blood. The blood itself seems to contain no elements which are not natural to it.

† It may be said that an inaccuracy is here expressed, but it is only seemingly such, for cells perform different functions. The function of a nerve cell being to receive and convey to the several parts of the system that something, which infuses all animate creation, which is limited in its operations by matter, but which is not matter.

‡ The germs of disease may be minute particles of animal or vegetable life, which we cannot at present discover; or the cause of a disease possibly depends upon some definite material mingled with the blood, and this material may be derived from a morbid transformation of some of the natural constituents of the blood.

ology. It will thus be seen, that so long as the cell remains healthy, the condition of the blood, if to the nutritious principles the diseased are only superadded,* can have little if any power to change its method of growth; and in this do we not receive an explanation of the localization of disease? The withdrawal of the controlling influence of the nervous system, may also depend upon the morbid condition of the blood. We are thus justified in assuming that the blood is at least the principal factor in the production of disease. This is an important point, but there is one more important: how does the blood become diseased?

Beyond doubt, the tendency to the development of a large proportion of surgical as well as of other diseases is inherited; but it is not probable that peculiar conditions of the blood alone represent a constitution capable of being transmitted from parent to offspring. Mr. Paget† says: "Doubtless, the blood and the nervous system, the connective tissue and the lymphatics, pervading, as these do, nearly every part, have very large shares in a constitution, and defects and diseases in them would so quickly and so greatly influence the whole, that a disease, if it could be in any one of them, might, without serious error, be spoken of as constitutional. Still, it is not right to regard any one of these, or all of them together, as the sole factors of a constitution: for, in some cases, as much might be said of a single organ. . . . A constitution should not be thought of as less than the sum of all those intrinsic things from which a whole health character is derived." A changed condition of the blood is a part, and we are disposed to consider it the principal part, of a dyscrasia, but the whole constitution suffers.

* An illustration of this is found in cancerous affections; the blood long contains the proper nourishment for all the tissues, even while the cancer is making progress.

† Clinical Lectures and Essays. Sir James Paget. Edited by Howard Marsh. London. Longmans, Green & Co. 1875.

The origin of constitutional disease is extremely difficult to trace, and this, principally, from two circumstances, both of which are connected with their development. The evolution of disease, that is, the change in type, may be acquired through generations, thus: a constitution which developed cancer in a great grandparent, may become so modified in the great grandchild as in him to produce a simple fibroid tumor. The laws of inheritance make it possible for a parent to transmit a disease to an offspring with which he, the parent, was not conscious of suffering.

Perhaps one of the most potent causes of an abnormal condition of the blood, is disease of some organ of the body. Healthy nutrition requires that each part of the system shall extract from the blood its peculiar pabulum. An organ may become mechanically disordered, and so prevented from performing that function of extraction which belongs to a healthy state. Certain properties are thus retained in the blood, and as no organ ought to appropriate these, and could not do so if in a normal condition of life, they remain in the blood until the vitality of some cell or cells, (I here employ the term cell as synonymous with that of organ) is reduced, when these properties are taken up by such cells, and a constitutional disease becomes localized.

Mental conditions are, we believe, influential in producing, as well as in developing, constitutional diseases. The nervous system is directly affected, and the brain, acting abnormally, throws upon the organism elements which it should eliminate from the blood.

Constitutional diseases may also be acquired through contagious and infectious diseases, and those which are capable of inoculation. In all such the blood is altered in a peculiar manner, and by reason of the disposition which diseased constitutions show to revert to the healthy type (we do not say that this is often accomplished) through generations, syphilis, for example, may become wholly changed, and appear as some innocent growth.

All tissues are not equally susceptible of perverted action. When Virchow advanced the cellular theory of disease, which attributed the seat of all pathological formations to the cellular tissue, a great advance was marked in the study of pathology, but more recent investigations, (especially may we refer to those made by Mr. Creighton, at the Brown Institute, and published in Mr. Simons' Reports), have shown that changes in epithelial cells are the cause of at least nine-tenths, if not of all, pathological growths. This is an important fact, let us try to ascertain some reason for it. Epithelial cells resemble the white corpuscles of the blood in their marked disposition to hypernutrition. They cover the surface of the body, and from their position are liable to be affected by changes in the blood supply. They multiply very rapidly when over nourished, "so that one mass may perhaps be the parent of five hundred in the time which, in a perfectly healthy state, would be occupied in the production of two or three cells."* The rapid multiplication of cells is generally associated with their degenerations, for they do not have an opportunity to mature, to develop a formed material, which acts in the capacity of a filter to substances brought in contact with the cell. We have already adverted to the matter of cell division by means of nuclei and it is probable that with the development and growth of nuclei, new powers are evolved; these it must not be supposed always mark progress, but they, on the contrary, are liable to retrograde in type, so that, when we speak of new powers being evolved from centres, in connection with abnormal growths, we mean that though some powers have thus been lost, others of a lower grade have been acquired †

To glandular tissues, in general, and to the mammary glands in particular, do these remarks upon epithelium

* Disease germs, their nature and origin. Lionel S. Beale.

† Instances of this *giant cell* development are found, physiologically, in bone manure; pathologically, in tumors of every kind.

apply with especial force, because in no other part of the body in which epithelial tissue exists are there so many sudden alterations in nutrition, and such rapid multiplication of cellular elements as are observed to take place in the female mammæ. From the period of puberty until the climacteric they are hardly at rest, and even then are subject to irritations, arising in the generative organs. Lactation may become a source of evil, especially that portion of it which is embraced by the involution of the gland. During the evolution of the gland an increased quantity of blood is sent to the part, and the glandular epithelial cells are multiplied rapidly. At the cessation of lactation, and during involution, the gland gradually shrinks, and the epithelial cells are in a state of vacuolation; but instead of this process resulting in the formation of colostrum corpuscles, as it does during lactation, the contents of the cell is in a great measure replaced by a clear, fluid material, and the nucleus is displaced towards the periphery. Furthermore, the product of secretion, colostrum, being no longer required for the production of milk, becomes a cellular waste to be taken up by the lymphatics. These waste cells do not resemble the parent cells, neither do the spindle shaped cells found in the interacinous tissue during lactation resemble the large yellowish cells characteristic of lactation which they replace,* the yellow cells themselves being a product of epithelium. It thus appears that epithelial cells, in accordance with physiological processes, are exposed, in certain locations of the body, to undue irritation, and that they are also liable to produce cells unlike the parent cell.

In its incipency, a diseased cell is not distinguishable from a healthy cell. The difference between them must be absolute as soon as a departure from health occurs, but

* Upon the surface of the ventricles of the brain are first found ciliated epithelium, but later the parts are invested with simple scaly epithelium.

the line is imperceptible which divides a physiological from a pathological process; the belief seems reasonable that primary changes, which develop into pathological growths, most frequently occur in those histological elements in which normally, cellular substitution takes place, and which normally gives rise to cells differing from the parent cell.

The conformation of the mammary gland is favorable to disease, especially while functionally active. During lactation, the flow of milk from one or more of the minute tubes, of which the gland is composed, may be arrested. The watery principles of the stagnant milk are absorbed and the more solid principles remain, and thus a tumor is formed.

Thus far we have spoken of the predisposing causes of disease; let us now briefly consider the exciting causes of disease; and first we will say that though generally an exciting cause is necessary for the development of a constitutional disease, it is not always so, for we should regard the constitutional disease in some instances as a progressive stage of the diathesis in which it originated.

The changes which occur in the female breast at the time of puberty, are, if associated with irregularity in the establishment of the menstrual flow, well calculated to localize a constitutional disease, or to excite cellular changes in the gland itself. In the majority of instances the passage from girlhood to that of maidenhood is made in safety, but on the other hand, it is not unusual to find the breasts swollen and inflamed from the sympathy which they at such times have with the generative organs. And here we will speak of the probable manner, in which inflammation from any cause is productive of lasting disease. One of the constant conditions of inflammation, is an increase in the number of the minute particles of bioplasm derived from the white corpuscles of the blood, as well as an increase in the number and the size of the corpuscles themselves. These phenomena are caused by

hypernutrition, which in its turn is the result of some obstruction offered to the passage of blood through the blood vessels. As the multiplication of living matter continues, the blood vessels become very much distended, and circulation ceases. The thin portions of the blood pass through the walls of the vessels, and finally a mass composed alone of particles of bioplasm, remains. These particles do not cease to multiply, and the walls of the vessels being greatly distended, mechanically and by paralysis, yield to the pressure from within. The process may be very limited in extent, involving only a few small capillaries, which become isolated from the general circulation by the formation of fibrinous* clots in the vessels. The diseased structure thus becomes a foreign body, and if not removed, will continue to degenerate. It is probable that nothing useless exists in the body, not even a capillary vessel, and therefore some parts must suffer from the poor quality of blood caused by the increased amount of pabulum, which the diseased structures have taken up. Furthermore, pus corpuscles may be derived from the white blood corpuscles when the latter multiply rapidly; in this manner abscesses are formed. But the inflammatory process may be more general. In such an event, though the vessels are distended, the circulation is not wholly obstructed, and the system may accommodate itself to the increase in the bioplasm of the blood.

But we think even in slight inflammations, that some abnormal condition of the vessels in which the disease centered, remains, and if a part of the system is not able to resist injurious influences, the abnormal state of the blood will cause disease at that place.

During menstruation and lactation, the blood supply to the breast is increased, and the blood is as pabulum to the breast tissue. The gland cells being thus over nourished

* Fibrin, probably, does not exist in living blood, but is formed by the death of the minute particles of bioplasm derived from the white blood corpuscles.

increase in number and in size, so originate cases of permanent enlargement. Aside from the danger attending lactation, gestation is conducive to the health of the mammary glands, for that life is incomplete in which one of its functions remains dormant.

At the climacteric, diseases, especially of a constitutional origin, are developed in the mammæ, and this not only because of sympathy between the generative organs and the mammary glands, but also because of the presence in the organism of certain constituents which hitherto were removed by means of the menstrual flow.

The prominent position of the breasts upon the thorax, expose them to mechanical injuries; and the young child whose first instinct is to obtain nourishment, often with the mouth or hands inflicts injuries upon the sensitive gland tissues, which are frequently followed by serious consequences to the mother.

The surgical diseases of the mammary gland admit of a division into four classes. The *first* class may be made to include anomalies of development; the *second*, diseases dependent upon the introduction of an animal parasite into the system; the *third*, diseases associated with the functional activity of the gland, inflammatory in their nature; the *fourth*, diseases characterized either by an abnormal growth of the gland tissue, or an increase in the number of the histological elements of the gland. The first two divisions call for no comment; an explanation of the remaining two, will, we think, not be misplaced.

There is no absolute dividing line between the third and fourth divisions. One is, in many instances, the germ of the other. But there are differences, and these are mainly in relation to degree of activity, period of development, and histological anatomy. Diseases associated with lactation, or the life of the generative organs, are characterized by a considerable degree of activity. They are developed suddenly, and pass through their stages rapidly. When the source of irritation is removed, the symptoms

gradually subside, and the parts return to an apparently normal condition. In this class of disorders, the diseases which constitute our fourth division may arise, but between the cessation of the one and the appearance of the other, there is a varying interval of time; so that it may be said that no disease exists, but the germ of disease exists; and this may develop spontaneously, or, more frequently, is called into activity by some exciting cause. The diseases belonging to our fourth division are not directly associated with the conditions of the generative organs; neither do they exhibit marked activity and then subside, but they gradually increase through a period, sometimes of years. But the chief point of difference between the two classes of disease is to be found in their minute structure.

The diseases associated with the functional activity of the gland have little pathological histology, save that which is dependent upon inflammatory processes. Perhaps an exception should be made in favor of pus, but this differs from a true pathological element, in that it possesses no inherent power of growth. Pus is not independent of the process to which it owes its birth, but its increase depends upon the constant and excessive multiplication of inflammatory lymph cells, from which the pus cells are derived.

Acknowledging the truths of the theory which Virchow annunciated, that all pathological growths arise from physiological growths, and, however they may differ in their cellular elements from the typical cells of the body, they have a prototype in physiological processes, we are obliged to discard the doctrine of absolutely new growths, and to limit pathological formations to the production of a structure at a point where it does not belong—*Heterotopia*,—at a time when it ought not to be produced—*Heterochronia*;—or to an extent at variance with the typical formation of the body—*Heterometria*.*

* Cellular Pathology. R. Virchow.

The second abnormality, *Heterochronia*, cannot at present be maintained, for too little is known of the development of the healthy body, to compare the different stages through which cells pass, with pathological growths.

The following will be considered :

PART VI. THE SURGICAL DISEASES OF THE MAMMARY GLAND.

Chapter I. Anomalies of development.

Chapter II. Diseases depending upon the introduction of a parasite into the system.

Chapter III. Diseases associated with the functional activity of the mammary gland, and of the generative organs.

Chapter IV. Diseases characterized by an abnormal growth of the gland tissues, or an increase in the number of the histological elements of the gland. Section 1. Production of a structure in extent at variance with the typical formation of the body, *Heterometria*.—Section 2. Production of a structure where it does not belong, *Heterotopia*.

PART VI.—THE SURGICAL DISEASES OF THE BREAST.

Chapter I.—Anomalies of Development.

There is this difference between development and growth. By development a part is fitted for higher conditions of life ; development is evolution. By growth a part increases in size ; growth follows development. An anomaly of development, therefore, is the expression of a low formative power ; and by this, reference is had to the position which the anomalous part occupies in the creative scale. For clearly, the multiplication in man of an organ normally single in him, or the absence of a part normally present, both of which conditions are to be found in lower animals, indicates no deficiency of vital energy, but rather a failure to evolve from low, high forms of animal life ; therefore, we say the formative power is low.

Anomalies in the development of the several parts of the reproductive system—and with these we are at present especially concerned—are difficult to explain. Dr. Knox has advanced a theory which is deserving of consideration. He believes that the embryo is originally hermaphroditic, and contains the elements of both sexes, and that the development of the male or female is determined by some unknown cause acting upon the one or the other set of elementary parts. May not this unknown cause be related to the nourishment of the embryo, or, possibly, the impregnated and impregnating elements? Among bees, if a neuter, when in a state of larva, or a few days after being hatched, is placed in a large cell—the royal cell—and given a peculiar kind of aliment, a female is produced—the queen bee; if fed in this way in its own cell, a male is produced; if fed upon common food, a neuter is developed. May not some likeness be traced between the conditions of insect and animal life, even that of the higher animals? It is not probable that in this state of existence we will know the circumstances which lead to the determining of sex in human beings, for such knowledge would be productive of confusion in nature; but so close are the analogies between the different parts of creation, and the lower so frequently seems to predict the higher orders, that it is justifiable to assume that the same laws obtain, at least in kind, in the higher animals, which are known to exist in some of the lower forms of life. No explanation, however, of the abnormal numerical increase of organs is afforded in the supposed hermaphroditism of the embryo, for, as Mr. Simpson remarks,* “we must not only assume that the embryo contains the elements for the development of both sexes, but also that it contains several germs for each organ, which germs may, under favorable but unknown conditions, each give rise to a separate organ.” But is this latter assumption unreasonable? Each cell in the

* The Obstetric Memoirs and Contributions of James Y. Simpson, M.D., F.R.S.E. Philadelphia, J. B. Lippincott & Co.

body is capable of reproducing similar cells, and these, representing every tissue and organ of the body, aggregate at the reproductive organs.* Many of these cells remain dormant—undeveloped gemmules—in the semen and ova, in the embryo, and even in the fully developed being, until some circumstances occur to call them into activity. These circumstances may be found in the changed conditions of the life of the individual, in the method of the aggregation of the cells, or possibly in some peculiarity of the generative organs, which allows of the excessive development of a certain group of cells. It is not therefore in the embryo that the causes for the abnormal multiplication of parts are to be sought; in the embryo they are already multiplied. But this is only carrying the question one stage nearer to its solution. The matter of the origin and conditions of life is recondite. Nothing is known beyond the tortoise upon which the elephant stands.

M. Isidore St. Hilaire divides the whole reproductive apparatus of both sexes into three transverse spheres, each one containing two segments: 1 and 2, the deep organs, testicles and ovaries; 3 and 4, the middle organs, prostate gland, vesicular seminales and uterus; 5 and 6, external organs, penis and scrotum, clitoris and vulva. To the latter sphere we would add the mammary glands, as being at least accessories of the reproductive system. Now it is probable, again judging from analogy, that the germs of each sphere, as well as the fully developed organs, are capable of becoming diseased. If at the proper time the germs which are to develop into the mammæ do not receive the proper kind or quantity of nourishment, either the glands are not developed at all, or more than the normal number of germs remaining to be developed, and the conditions being present for their development, there is a retrogression in general formative type of the individual, if the individual is high in the crea-

* The Variation of Animals and Plants under Domestication. Chas. Darwin. Vol. II. New York, Orange Judd & Co., 1868.

tive scale. The causes of the error in the nutrition of the germs may be sought for in the parents of the offspring.

These spheres were considered by M. Isidore St. Hilaire, to possess independent action; one, it was thought, could become diseased, while the others remained healthy. This we think cannot be substantiated, neither indeed can the opposite. But it is a law of nutrition, that when one organ is excessively developed, some other organ is developed in an inverse ratio. If observations were more accurately made, and statistics more carefully compiled, it could probably be shown, that when one organ of a series, which has an equivalent part in both sexes, is greatly developed, it will be so at the expense of some other organ of that series.

Complemental nutrition may be a cause of anomalies of development, and in this manner.

It would be contrary to what has been observed of natural laws, to suppose that the order of the appearance of organs in the embryo is a matter of chance; it would be contrary to our knowledge of nature, to assume that this sequence is arbitrary, and useless, that another would have done as well. Aside from the deep spiritual significance which all things pertaining to the development of the human being have, there is a physiological reason for the peculiar method after which individuals are constructed. Throughout nature, lower forms of life appear as steps towards the accomplishment of more perfect forms, and so in all organized beings the parts which first appear in the course of the development of the individual, prepare by elimination or addition, for the development of the parts which appear later.

It is probable that this process of preparation is accomplished through the agency of the blood. For example, the peculiar condition of the blood which leads to the development and nourishment of the germs of the lungs, heart, Wolffian bodies, etc., in mammals, may by reason of these physical processes be so changed before the end

of the second month of pregnancy, as to be fitted for the development and nourishment of the germs of the mammary glands.* We can conceive, therefore, how even a slight error in the nourishment of an early organ, or an abnormal condition of the blood, would result in the non-development or multiple development of organs which should appear late in the scale; for if at the right time, a special kind of aliment is not furnished, the organ which is to be nourished degenerates, either in form or in structure, and can never regain its former position.

Anomalies in the development of the breast, relate to the number of *glands* and the number of *nipples* developed. Hence are formed for discussion: Supernumerary glands.† Supernumerary nipples.

§ I. SUPERNUMERARY GLANDS.—When compared with other anomalies, the development in man of more than the normal number of *mammæ* cannot be considered as a very rare deviation from the general formative type. The anomaly has most frequently been observed in women, but Dr. Petrequin‡ saw a man with three distinct *mammæ*, two on the left side, the supernumerary breast being situated above the normal one. This man had five children, three sons and two daughters. The sons had *mammæ* as their father. The two daughters also were tri-mammal. The daughters were married, but their children presented no such anomalies.

In remote times this error in development was attributed to the mental condition produced upon virgins and pregnant women by their contemplation of the statues of Isis

* "The mammary glands are already apparent at the third month of pregnancy." A Manual of Anatomy, by G. F. Meckel, Vol. III. Philadelphia, Carey & Lea. 1832.

† A few cases of absence of one or of both *mammæ* have been reported. (See The Diseases of the Breast. John Birkett.) The anomaly is very rare.

‡ The London *Lancet*, October 1, 1837.

and Diana, which are represented with numerous mammæ. More recently, supernumerary glands or nipples were thought to appear only in those persons who practiced the black art. It was believed that to each such person was given a certain number of imps to nourish, and "the teats through which these imps sucked, were indubitable marks of a witch." Of the first hypothesis, the most that can be said is, that it is improbable. The second is a record of ignorance, and therefore superstition, both of which were the outgrowths of a system of great religious intolerance.

No regularity seems to exist in the number or situation of supernumerary mammæ. Gorré mentions a woman who had five breasts. Four of them were prominent and full of milk, each having a large nipple, well raised and surrounded by a dark areola. The fifth breast was small, and did not seem to be influenced by lactation. Two breasts were situated on each side, one above the other; the fifth occupied a position about four inches above the umbilicus. An aged woman residing at Psullendorff, Germany, had four mammæ, two on each side. M. le Docteur Gardeur spoke of a mulatto woman who had two breasts in the natural situation, and two others situated near the axilla. Mammæ have been found developed on the back; and M. Roberts reports a case of one on the left thigh, from which the mother nursed her children. This appeared as a simple næves until the woman became pregnant. The mother of this woman had three breasts, all of which were situated upon the chest. Mr. Jussieu reports the case of a woman who had a third breast in the groin, from which lactation was performed. Sometimes this deformity is not noticed until pregnancy, the gland remaining inactive; but such can scarcely obtain if the nipple is well developed, for that prominence would lead to the detection of the adventitious breast. It is not unusual to find a supernumerary breast without any nipple, as in the case reported by Mr. Champion, of Bar-le-

Duc. The supernumerary gland was situated in the axilla, and had no nipple, but the milk exuded upon pressure, from six small openings in the skin.

Supernumerary mammæ are sometimes the seat of severe pain; especially has this been observed when the gland is not provided with the means for the removal of its contents. Cases of triple and quadruple mammæ occur with nearly equal frequency. M. Isidore St. Hilaire, however, states that tri-mammæ are the most frequent. It has been suggested by the same *savant*, that when the supernumerary mammæ are situated laterally, they yield milk, but not so when they occupy a position over the median line. This can only be substantiated by an analysis of a large number of cases. It would, however, seem to receive support from analogy, for in the lower mammals, with the exception of some marsupials, the nipples are developed on the sides of the median line of the body.

TREATMENT.—Supernumerary breasts may be the seat of any one of the diseases which attack the normally developed breast, but of the treatment of these we will not here speak; the treatment of the anomalous organ, will properly claim our attention in this place.

In the majority of instances the abnormal gland will require no treatment, but it is plain, from what has been said of the occasional situation of these organs, that surgical interference becomes at times advisable, if not necessary. If the breast occupies a position where it is liable to more than the usual risk of injury, or a position where it will interfere with the natural performance of other functions, in consideration of the susceptibility of these glands to become diseased from slight causes, and the uselessness of the adventitious gland, without strong opposing reasons, it is the duty of the surgeon to amputate the breast. If the abnormal organ is situated in the groin, it is evident that the motion of walking cannot but act as a source of irritation to the gland, especially if functionally active; and further, the irritation, if once established, may easily be communicated to the lymphatic glands in that region.

REMOVAL OF THE BREAST.—By *extirpation* of a breast, is understood the removal of a portion of the gland; by *amputation*, the removal of the whole gland. The nature and extent of the disease to be treated, will determine the necessary operation. The operation may be performed with the *knife*; the *scissors*; an *elastic ligature*, or with *escharotics*.

OPERATION WITH THE KNIFE.—The patient should lie upon an operating table or bed,* with the breast which is to be operated upon turned towards the operator, and the corresponding arm carried slightly upwards and backwards. Or if the surgeon can use both hands with equal facility, he may find it convenient to stand at the head of the patient. Before making an incision, it is well to encircle the chest above and below the breast with strips of adhesive plaster drawn tightly. This manœuvre will in a measure control hemorrhage. The shape and direction of the incision will depend upon the requirements of individual cases. In general it may be said, that when the tumor is small, and it is considered unnecessary to remove much of the healthy tissue, the incision should be straight, curved or semilunar. The latter method was first proposed by M. Velpeau. When it is thought best to allow any portion of the gland to remain, the nipple should, if possible, be preserved if the patient has not ceased to menstruate. If this precaution is not taken, secretions take place within the gland, and, having no outlet, are liable to prove a source of inconvenience. Unless contraindicated, the incision should correspond to the lower border of the pectoralis muscles. Amputation is best performed by a semi-elliptical incision, of sufficient length to include the whole diseased structure. There is little choice in the selection of instruments. A scalpel or straight knife will answer equally well. The tumor may sometimes, and if possible should be, dissected out with the handle of the knife, or the operator's fingers;

* Mr. Richeraud seated his patients upon a chair or stool.

in this way hemorrhage is controlled, and the healthy tissue uninjured.

Before the wound is closed, it should be examined, and any remaining portions of the morbid growth carefully removed.

It is desirable for wounds to heal by the first intention, especially so, after the removal of a malignant growth,* for the degeneration of cellular elements which constitutes the suppurative process, is favorable to a return of the local disease, therefore the use of ligatures is to be deprecated.†

The custom prevails among some surgeons of washing a wound repeatedly, for the purpose of removing all the blood it contains. This is frequently unnecessary, and we believe quite as frequently injurious. For effused blood, unless in large quantities, is not opposed to the healing process; moreover, the water used in cleaning the wound, may serve as a medium for conveying animal or vegetable germs into the body; and the rough manner in which assistants often use the sponge, causes additional irritation to the severed tissues. In operations of any magnitude, we are in the habit of using boiled water, to which we add a small proportion of *carbolic* or *salicylic acid*, for cleansing purposes,

* In the University Hospital at Baltimore a small elastic drainage tube has been used after the amputation of a scirrhus cancer of the breast. It is claimed that the healing progresses rapidly, and is accomplished by the first intention, save at the most dependent part of the wound where the tube is inserted.—*Archives of Clinical Surgery*, Aug., 1876.

† An antiseptic catgut ligature is less objectionable than one made of silk. For the animal matter of which it is composed, in time disintegrates, and is finally absorbed. But any ligature is a foreign body, and as such favors suppuration, and retards the healing process. Mr. Lister gives the following directions for the preparation of the catgut ligature: "One measure of water to ten parts by weight of crystallized carbolic acid; mix, and add one measure of the mixture to five measures of olive oil, in a suitable jar or wide-mouthed bottle. Then at once introduce the catgut, the hanks being opened up to allow access of the liquid to them, cover and set aside in a cool place."—*Edinburgh Med. Journal*, Dec. 18th, 1875.

and we instruct the assistant to press the sponge firmly, but gently, upon the cut surfaces.

The edges of the wound are best held in apposition with silver wire, over which a few strips of adhesive plaster may be passed to prevent the tension, which otherwise might be made upon the sutures. Dr. Hamilton* recommends, that over the wound be placed a piece of lint smeared with simple cerate, and over this several layers of cotton batting, the whole to be secured by successive turns of a roller. We can see no advantage gained by this dressing; on the contrary, it is probably injurious, for with it much heat is generated and retained at the seat of the injury. The lightest dressings during the healing of wounds have been observed to yield the best results.†

The antiseptic method of treating wounds, which, if not originating with Mr. Lister, has found in him a most ardent supporter, and was by him first described and brought to the notice of the profession, seems to prevent the excessive formation of pus, and therefore expedites the process of healing.‡

* The Principles and Practice of Surgery, Frank H. Hamilton, New York. Wm. Wood & Co., 1872.

† At Bellevue Hospital, in some of the wards, all dressings are dispensed with after amputation of the leg, and in some few cases, not even sutures have been used to bring the flaps together. It is claimed that the results are very satisfactory.

‡ The theory, upon which Mr. Lister bases the antiseptic treatment of wounds, is perhaps questionable. He believes that certain minute organisms suspended in the atmosphere are capable of producing suppuration when brought in contact with the cut surface of the body. Hence he concludes that any agent which will destroy the life of these particles, will prevent suppuration. But his postulate is not proven. For though MM. Pasteur, Schwann, and more recently Mr. Dollinger, and Prof. Tyndal, and other experimentalists, have shown that common air is laden with spores, heteromati, and bacteria, to the action of which many phenomena—as putrefaction, fermentation, etc.—are traceable, we have no trustworthy evidence, that a pus corpuscle is either descended directly from one of these atmospheric particles, or is the result of the action of these

The following is Mr. Lister's method.* The material used is *carbolic acid*, or *phenic acid*, as it is more usually designated in France. With this in its original strength the wound (if decomposition has already begun, is thoroughly cleansed. If the wound is recent this application is unnecessary. Over the wound is placed, first a piece of rag, saturated with a solution of carbolic acid in oil (crystallized carbolic acid, 1 part; boiled linseed oil, 4 parts, dissolve), and upon this a paste composed of about 6 tablespoonfuls of carbolized oil, with sufficient common whitening (carbonate of lime) to form a fine putty. As long as the discharge continues the paste is renewed daily, but when this ceases its use may be discontinued. The rag next to the skin, however, is allowed to remain until healing by scabbing is supposed to have been accomplished. In general the result leaves little to be desired, and healing by the first

particles upon the tissues of the body. All the evidence which we possess, is opposed to the first proposition: for the life-cycle of each minute organism begins and ends in a distinct genetic product, it continuously develops into the parent condition. The second proposition seems to be improbable; for those portions of the body, as the tongue and fauces, which are known to heal readily, contain bacteria in large numbers, and are constantly exposed to any impurities which may exist in the atmosphere. The majority of pus cells are probably formed from the white blood corpuscles, and by the rapid multiplication of the cells of the tissues in which suppuration occurs, and not from anything outside of the body. From this it appears that an *antiseptic* must act upon the tissues of the body or upon pus itself. Such an agent is found in the one which Mr. Lister uses—*carbolic acid*. This acid kills the living matter of the pus cell (*Disease Germs, their Nature and Origin, Dr. Beale*), and when diluted, the action being less violent, interferes with its growth and multiplication, by causing a cell wall to form and harden around the bioplasm. Mr. Lister's practice is excellent, but his theory is opposed to our present knowledge of biology.

* The *Lancet*, September 21st, 1867. Also see *Lancet*, March 16th, 1867, and April 3d, 1869. Also "On the effects of the Antiseptic System of Treatment upon the Salubrity of a surgical hospital." Edinburgh, Edmonston & Douglas, 1870.

intention may reasonably be anticipated.* Modifications and alterations have been made in the application of the antiseptic theory, but the essential points have been given above.

THE SCISSORS.—It has recently been proposed† to remove the breast with the scissors, cutting under ether spray. I am not aware that this method has been employed where anæsthesia was produced by inhalation. Plainly, great advantages must accrue from any method which will render unnecessary the use of narcotic vapors in surgery. For this reason we attach more importance to the local anæsthesia than to the especial instrument, with which Mr. Richardson operates. The scissors possess advantages over the scalpel in operating on frozen parts. Indeed, it is almost impossible to use the knife under such circumstances, but the scissors cut with the utmost facility. Mr. Richardson produces local anæsthesia, by first directing a spray of common ether on the parts, until they are thoroughly chilled, which is generally accomplished in about four minutes. At the end of this time a spray of the light fluid, called anæsthetic ether, a compound of ether, of *sp. gr.* 720, with hydride of amyl, is substituted, the application being continued for a few minutes only, when the whole breast will be frozen hard.

An incision with a scalpel being made at the outer margin of the part to be excised, a pair of slightly curved

* From the statement which Dr. Bohn made before the Medical Society of Vienna in 1868, it appears that carbolic acid is not essential to success. Both he and Prof. Dittel, have had excellent results from the use of chalk-soil, without the admixture of carbolic acid. Hence they conclude that success in the treatment of wounds is attained by the exclusion of air. But these deductions seem rather hasty, for because wounds heal without carbolic acid, does not prove that air retards the healing process, unless in the experiment the air is actually excluded, and in the methods used by Dr. Bohn, this requirement was not met.

† On excision of cancer of the breast by scissors, cutting under ether spray, by W. Richardson, M.D., F. R. S.—The *Lancet*, Aug. 29th, 1874.

scissors are entered, and carried down to the deeper gland structures, thus forming the lower flap; the upper flap is dissected up in the same manner. The tumor is then grasped in the left hand, and with a pair of slightly curved tooth scissors, all its connections with the surrounding tissues are severed. The ether spray should now be withdrawn, and the wound allowed to remain open a short time, to ascertain if any vessels bleed during the reaction from the freezing. If necessary, ligatures may be applied. The subsequent treatment is the same as that already indicated.

The operation, if properly performed, is absolutely painless. In the cases reported by Mr. Richardson, the patients only experienced a sensation of chilliness upon the first application of the spray, but were not aware when the tumor was removed.

THE ELASTIC LIGATURE, OR BLOODLESS METHOD OF OPERATING.—The use of an elastic ligature as a means for removing tumors, was introduced into surgery by Prof. Dittel, of Vienna. The possibility of such an operation was suggested to him while making a post-mortem examination of a young girl who died with "severe nervous symptoms." He discovered the rubber band of a hair net, which she had worn day and night for a month, deeply imbedded in the pericranial tissues, and in one place that it had cut through the walls of the skull, and was pressing upon the *dura mater*, which was in a state of active inflammation. The method was introduced into England by Sir Henry Thompson, who, on Nov. 21st, 1873, removed a fungous growth from the mammary gland of a woman, by passing two stout india rubber ligatures across and around the base of the breast, after the manner about to be described. The use of the elastic ligature has shared the fate of other inventions, and been shamefully abused. Prof. Dittel has even amputated legs in this way. Doubtless, the elastic ligature may be used with advantage in some surgical cases, but we are disposed to question if

among these should be enumerated the removal of the breast. We consider it rather difficult to conform one of the most elementary rules of surgery, viz, to perform an operation as speedily as is consistent with safety and thoroughness, and in such a manner as will entail the least possible suffering upon the patient, with its use in such cases. In the case operated upon by Sir Henry Thompson,* we cannot but feel that "the fungoid growth" could have been removed more scientifically by some other operation. We fail to perceive any advantage gained over the use of the knife. Chloroform was administered to the patient. The tumor was not removed until the tenth or twelfth day after the application of the ligature, and during this time a sphacelated mass of tissue remained in contact with the absorbents of the thoracic region, and was so offensive that constant irrigation with carbolic acid was found inadequate to destroy the odor which arose from the decaying tissue. The most that can be said in favor of operations performed with the elastic ligature, is that they are bloodless, or nearly so, and for this reason the method is a valuable adjunct to surgery; but we think its use should be restricted to those operations which we may reasonably expect will be followed by profuse hemorrhage, difficult to control.

The following is the method proposed by Prof. Dittel and followed by Sir Henry Thompson: "A piece of india rubber cord, about the size of a No. 4 catheter, is passed through the eye of a large curved needle set in a handle. Through the same eye a short piece of whip-cord is passed. The breast is then gently drawn from the subjacent tissues, and the needle carrying the india rubber and the whip-cord is made to transfix its base. When the point of the needle has emerged, the india rubber band is cut in two and the needle withdrawn, leaving the whip-cord uncut. Each of the two india rubber bands are now made to

* *The Lancet*, January 3, 1874.

encircle half of the mammæ and then tied tightly, as in the operation for nævus. The operation, which is quite bloodless, is now complete. The constant pressure of the india rubber cords causes linear sloughing, and in nine or ten days the breast separates. It may be added, that the whip-cord is passed through with the india rubber cord, because the latter occasionally breaks after two or three days. Sometimes only one side of the breast is tied at the primary operation, the other half being left until the first has been completely cut through. It will be observed that no cutaneous incision was made, but Sir Henry remarks, that although he wished to perform this particular operation exactly according to the rules of Prof. Dittel, he would, in future, prefer to make a slight groove in the skin, in which the india rubber ligature should lie.* After the tissue has sloughed away, the dressing of the wound does not differ from that after other operations upon the breast.

We have spoken somewhat at length upon this method of operating, for it has been endorsed by men justly renowned for their skill, and therefore deserves consideration, if not approval, at our hands.

ESCHAROTICS.—Perhaps the oldest method of operating is that which has for its object the reduction of the vitality of a part by means of chemicals, and its subsequent removal by sloughing. The dread of hemorrhage recommended such means to early surgeons. Latterly, escharotics have become associated with the name of charlatan; but for such a reason it would be unscientific to discard as useless this adjunct of surgery; it is desirable, however, that it should be limited to its proper place and use in the healing art.

The method which bears the names of its inventors, Drs Marston and McLimont, embraces the essentials of the escharotic treatment of tumors. It is claimed that it has been successfully employed in some cases, but it savors of an empiricism not agreeable to a true follower of

* *The Lancet*, Nov. 29, 1873.

Hahnemann. The pamphlet of Drs. Marston and McLimont,* from which the following description is taken, is interesting more for the earnestness and honesty with which the authors seek to maintain and establish their views, than from any scientific knowledge which may be acquired from its perusal.

After subjecting the patient to "a little preparatory training, chiefly dietetic," that she may not break down under the debilitating effects of the "enucleation process," a mixture of ice and salt is applied to the cancerous tumor—I am not aware that it has been employed against any other affection of the breast—to deaden the sensibility. The parts are then dried, and the tegumentary covering destroyed by means of undiluted nitric acid. After washing the breast with cold water, a piece of lint, spread with a paste (composed of a strong decoction of *Hydrastis* root, powdered *Hydrastis*, chloride of zinc and flour) and *Stramonium* ointment, is applied to the surface. This dressing is allowed to remain undisturbed for twenty-four hours, and upon its removal a hard, dry eschar will be found to have formed. Through this eschar "vertical incisions are made with a scalpel to the depth of about $\frac{1}{20}$ of an inch, care being taken not to draw blood. These incisions should be parallel to one another, at a distance of about half an inch apart, and into each is inserted a thin slip of calico smeared with the paste; over the whole a *light* compress should be applied, and kept in its place by a strip of adhesive plaster. The incisions are deepened, and the dressings removed usually every day, and this is continued until the paste has percolated the entire mass of the tumor." The sphacelated mass generally comes away in about a fortnight, and the remaining wound is treated by "the daily application of a piece of cotton wool spread with *Stramonium* ointment, as recommended by Dr. Fell." The constitutional treatment consists in the administration

* Cancer and the New Mode of Treating it, with illustrative cases, by C. H. Marston, M.D., & R. McLimont, M.D., London.

of *Belladonna*, *Amm. m.*, *Arsenicum*, *Aurum*, *Carbo an.*, *Cinchona*, etc.

After operating upon the breast, as well as any other part of the body, it is well to administer one dose of *Arnica* or *Calendula*, according to the indications. We generally give the *zc.* in water. Subsequently, *Aconite*, *Belladonna*, *Cicuta v.*, *Staphysagria*, *China*, *Lachesis*, *Hepar s.*, *Silicia* and *Mercurius*, may be found useful, but the medicines must be selected carefully in each case, and may embrace the whole *Materia Medica*.

A simple water dressing will frequently aid the healing process, but sometimes exuberant granulations follow the use of this dressing.

A very weak solution of *Calendula* proves an excellent dressing. It will in many instances prevent suppuration, or control an excessive formation of pus.

Sometimes an ulcerating surface will remain at the site of the incision; this will in general be quickly healed by the use of *Balsam of Peru* made into an ointment. We use it in the proportion of *Balsami Peruviani*, a half drachm, *unguente cctacea*, one ounce. *Silicia* or *Hepar sulph.*, will often be found useful in these cases.

To avoid repetition we have described the operations for the removal of morbid growth of the breast, as well as of the breast itself, in this place.

§ II. SUPERNUMERARY NIPPLES.—The development of more than one nipple for each breast, is not as rare an anomaly as the one of which we have spoken.* The two deformities are probably different expressions of the same abnormal condition. For if we will consider the manner in which glands are developed, from the surface inwards, it becomes apparent that the nipples, into which each lobe of the gland enters, and through which a communication is established between the interior of the gland and the sur-

* Instances of bifid nipples have been observed, the opening of the milk duct occupying the apex of the cleft.

face of the body, mark a point in the integument at which the depression first occurred, from which subsequently a mammary gland was developed. Each mammary gland, —or more accurately, each congeries of mammary glands —must be supplied with an opening of this kind, and therefore strictly speaking, it is a misnomer to say that a gland possesses more than one nipple. The number of nipples corresponds with the number of glands, and so when a breast has more than one nipple, that breast is composed of as many glands as there are nipples. Hence the anomalies of supernumerary glands and supernumerary nipples, seem to differ in this respect: the position of the abnormally developed glands.

In general the supernumerary nipples are well developed, though the supply of milk is not usually as abundant as that from a breast with one nipple, for the gland is not of an equal size. Seven nipples have been observed on one person.* This patient had two breasts, five nipples on the left, and two on the right side. They all gave milk, and the woman, who was a nurse, was so greatly inconvenienced by the constant flow, that she applied at one of the London hospitals for relief. Jean Borel speaks of ten nipples on one breast. There seems to be no regularity either in the position or number of supernumerary nipples.

TREATMENT.—Supernumerary nipples may become very troublesome during lactation, and for this reason, and also because they constitute a deformity, may sometimes call for treatment at the hands of the surgeon. The only effective means of treatment, is to remove the abnormal growths either with the knife or scissors, but it may be questioned whether this is ever advisable. For if the opening by which the secretion of the gland is excreted, is closed, and the gland becomes functionally active, it is clear that the accumulated lacteal fluid may be productive of serious re-

* *The Lancet*, July 21, 1842.

sults. The gland belonging to the adventitious nipple could perhaps be removed, but we believe it would be almost impossible to dissect its lobes from another gland without injuring the latter so as to render it useless and even harmful. The nipples should not be removed after the age of puberty; before that time, possibly, the operation may be performed with impunity. If performed soon after birth (but this is sometimes not possible, as the nipples may not attract attention until lactation) it may be that the adventitious gland would be developed no further, and at puberty or lactation, only the gland which is the most perfect, secrete milk. The surgeon when called upon to treat such a case must use his own judgment to decide whether the advantages gained are commensurate with the risk encountered by an operation.

The operation is best performed with a pair of scissors curved on the flat.

Chapter II.—Diseases which depend upon the Introduction of an Animal Parasite into the System.

It is probable that the lowest form of animal life which has been observed, is the habitation of some still lower form of life. Even *amœbæ*, apparently structureless masses of living matter, on the very confines of the animal kingdom, into which they are admitted by reason of their "vital movements" and chemical reaction, may harbor some still more primitive forms of life than they themselves represent. To this hypothesis it may be objected, that as the animal kingdom has for its beginning a single cell, and that as such a cell seems to be the point at which matter becomes infused with life, therefore it is illogical to suppose that this elementary particle, this visible beginning of life, contains within it, forms of life nearer the source of vitality, forms which antedate this lowest perceptible animal, this microscopic simple cell, in the animal kingdom.

Animal parasites are low forms of life,* which, during a part or the whole of their existence, live upon (*epizoa*) or within (*entozoa*) some more highly organized animal. They do not form a special class in the animal kingdom, but belong to all its classes, with the exception of the mammalia. They are found most frequently among the articu-
lata.† Authors describe three orders of animal parasites : I, Protozoa ; II, Vermes worms ; III, Arthropoda.‡ The second order, *Vermes*, will here properly engage our attention.

Intestinal worms are found in the majority of animals, though some animals, and the inhabitants of certain countries, seem to be notably infested with these parasites. Mr. Owen§ gives eighteen as the number of species of intestinal worms which may infest the human subject, and of these at least fourteen are well established species of Entozoa ; Heller increases the number to twenty-one. In Iceland every seventh person is said to suffer from the *echinococcus*, a worm found almost exclusively in the small intestines of dogs. Persons who use pork extensively as an article of diet, or those persons who are engaged in the breeding of swine, are liable to become infested with the *tænia solium* or the *trichina spiralis*, both of which parasites inhabit the intestines, or flesh of pigs. Men become infected with the *tænia mediocanellata* from eating veal and beef, in which the larvæ of this worm

* The *Gregarina*, a species of microscopic parasite which infests the internal cavities of some insects and worms, is a mere cell, without perceptible organs ; so also is the *Distoma tarda*, found in certain fresh water snails.

† An Essay on Classification. Louis Agassiz. London, Longman, Brown, Green, Longmans & Roberts, 1859.

‡ A Manual of General Pathology. Ernst Wagner. New York, Wm. Wood & Co., 1876.

§ Lectures on the Comparative Anatomy and Physiology of the Invertebrata. Richard Owen. Vol. I. London, Longman, Brown, Green & Longman, 1843.

sometimes exist. Certain species of fish, notably those belonging to the salmon and trout family, harbor the larvæ of the *bothriocephalus latus*, and man becomes infected from eating the flesh of such fish. The ova also find their way into water, and by this means gain access to the stomach of human beings. The lower animals are rarely a host of this parasite.

The sexually mature intestinal worm is composed of a head and segments. The sexes are separate, or one (*tænia echinococcus*) or more (*tænia solium*) of these segments is each provided with a complete sexual apparatus, consisting of both male and female generative organs (*androgynous*), developed, in comparison with the size of the parasite, to an extent unknown in other animals. In some instances the segments are self-impregnating; in others, probably impregnation is accomplished by the union of two segments. The mature ova either escape from the uterus before the segment is detached from the head—this is sometimes accomplished through the bursting of the uterine walls, the vaginal orifice being too small to admit of the passage of the ova;—or by spontaneous fission the segments (*proglottides*) become detached, and pass out of the intestines with the excrement. The proglottides may then be ruptured and the ovum set free, but more frequently, the proglottides, in their continuity, are introduced into the stomach of some other animal with his food, and there, by the action of the gastric juices, dissolved. In the stomach the ova develop a certain number of hooklets, with which they penetrate the walls of the stomach, and gain access to distant parts of the body; or the ova enter the blood vessels, or lymphatics (Virchow), and so migrate, passively, from the point of their introduction.

The embryo, when it has gained a situation which furnishes the essentials for its future existence and growth—if through chance it is carried elsewhere, it dies—excites in the surrounding cellular tissue a degree of inflammation, by which a dense cyst wall is formed, at

the expense of the structure in which the parasite is lodged. This is the cyst worm, the larvæ state of the intestinal worm, which only requires to be introduced into the stomach of a third animal to be in it developed into a sexually mature intestinal worm. This cycle of existence, as Mr. Owen has truly remarked, is not a metamorphosis, but a metagenesis. It is an alternate generation, in which several stages in the life of an individual are represented; but these stages are peculiar, in that the individual thus existing propagates, asexually, by gemmation. The product of this gemmative process bears no resemblance to the parent, and in some instances, as among plant lice (*Aphides*), requires many generations before the mature ova-producing creature is developed; but the whole constitutes the metagenetic cycle of one individual.

The phenomenon of asexual reproduction which has been observed to take place in the larva state of some of the lower forms of animal life, is not clearly understood. Mr. Owen* has suggested that not all the progeny of the primary impregnated germ cell, the result of the sexual act, the secondary or derivative impregnated germ cell, are required in constructing the tissues of the new animal, but that some remain in the animal unchanged, ready under the favorable circumstances of light, heat, etc., to "repeat the same process of growth by imbibition, and of propagation by spontaneous fission or those to which itself owed its origin." If to these methods of growth is added that of gemmation, and there appears no reason why this should not be added, for gemmation and spontaneous fission are essentially the same process, an explanation is furnished of the asexual reproduction of intestinal worms.†

* Parthenogenesis, or the successive production of procreating individuals from a single ovum. Richard Owen. London, John Van Voorst, 1849.

† Concerning the origin of the elements of sexual reproduction, Mr. Darwin dissents from the opinions held by Mr. Owen. Mr.

A single parasite is found in the breast; this is the larva of the *tænia echinococcus*, the hydatid tumor of authors. The grounds upon which Küchenmeister* distinguishes two species, *E. altricipariens*, *E. scolicipariens*, seem insufficient to justify such a division,† for both are the larva state of one worm, *tænia echinococcus*, their only difference consisting in the separation, or non-separation, of the young echinococci from the parent cyst, and the number of hooklets which they possess. These differences are probably referable to the age and the conditions of the development of the parasite.

The *tænia echinococcus* is one of the smallest of intestinal worms. Its principal habitation is the intestines of dogs, never of men. Cuvier had not seen this entozoon, and therefore he doubted the existence of both the larvæ, and the mature worm.‡ but its existence as a distinct species has been incontestably established by the researches of Leuckart,§ Van Benden, Von Siebold and others.

The sexually mature worm is composed of a head and three or four segments. Only the last segment is provided

Darwin believes that the primary impregnated germ cells are not formed within the ovary of the female, and fertilized by the male, but that they are formed independently of sexual concourse by each separate cell of the body, and merely aggregated within the reproductive organs. In asexual reproduction, these cells, not the progeny of the primary impregnated germ cell, are aggregated within this parenchyma of the individual, and developed by light, heat, etc. — *The Variation of Animals and Plants under Domestication*. Chas. Darwin, Vol. II. New York, Orange Judd & Co., 1868.

* On Animal and Vegetable Parasites of the Human Body. Dr. Frederick Küchenmeister. Sydenham Society, 1857.

† Entozoa. J. Spencer Cobbold. London, Groombridge & Sons, 1864.

‡ Le Règne Animal. Georges Cuvier. Paris, Fortin Niasson et Cie.

§ Die Menschlichen Parasitum. Rudolph Leuckart, Leipzig und Heidelberg. 1863.

with sexual organs. This segment greatly exceeds in size the remaining portions of the body. The embryos, after they escape from the proglottis, gain access to the stomach of man, with his food, or by contact with the infecting animal. From the stomach, they burrow their way, or are carried in the blood vessels or lymphatics, to some distant organ, usually the liver, though no organ in the body is exempt from their invasion.* The cyst worm or larva is a sac composed of two layers; the outer, *ectocyst*, is structureless, consisting of a substance closely allied to chitine; the inner, *endocyst*, Mr. Huxley regards as the vital element of the animal, from which the buds spring. The sac is filled with a clear yellowish fluid, sometimes bloody, having a specific gravity of from 1.007 to 1.015, contains no albumen, a small proportion of succinic acid, but is rich in chloride of sodium. From the *endocyst* daughter vesicles are developed; in man, the scolices are usually developed from the daughter vesicles, and not from the primary vesicles.† Occasionally there is only one daughter vesicle, in which case no space is left between it and the primary vesicle, or there may be many vesicles, each containing several cyst worm heads. The scolices in health are always attached to the vesicle from which they germinate; when found floating about in the fluid contents of the cyst, the condition is a morbid one.‡ By a process of eversion, the scolices can be protruded from that portion of the endocyst which forms the wall of the broad capsule, but during the life of the animal they are usually retracted. Small calcareous concretions are found in the parenchyma of the cyst wall. These may be considered as the first evidences of

* For statistics of the relative frequency of the invasion of organs, see Cobbold.

† Cyclopædia of the Practice of Medicine. Edited by Dr. H. Von Ziemsen, Vol. III. New York, Wm. Wood & Co., 1875.

‡ Entozoa. J. Spencer Cobbold.

a cutaneous skeleton.* They are highly refractive. The primary cyst varies in size from that of a pin-head to that of a child's head, and firmly adheres to the enveloping cyst in all its parts.† In very large cysts the parent vesicle appears to be wanting; either it is mixed up with the young vesicles, or else disappears, from the excessive attenuation to which it is subjected.‡ The enveloping cyst is generally somewhat thicker than other cysts similarly formed, apparently made so by an abundance of protentous inorganized substance. The thickness of the walls, renders the nourishment of the parasite rather difficult to explain. The fluid which the cyst contains, and upon which the animal lives, is probably secreted by endosmose,§ but so small are the pores through which this process is carried on, that they have thus far eluded observation.

The echinococcus cyst proliferates throughout its whole extent. In some instances the daughter vesicles become detached from the parent cyst, and float freely in the contained fluid; in other instances, a long pedicle remains, through which a communication is maintained between the vascular layer of the primary and secondary growths.|| In general the echinococcus continues to live and proliferate for years, but occasionally a calcareous degeneration takes place in the cyst, and ultimately the whole vesicle is converted into a limy concretion. Women are more liable

* Comparative Anatomy. C. Th. v. Siebold and H. Stannius. Boston, Gould & Lincoln, 1854.

† Mr. C. Handfield Jones believes that this parent cyst has no organic connection with the enclosed cyst. A Manual of Pathological Anatomy. C. Handfield Jones, Edward H. Sieveking. Philadelphia, Blanchard & Lea, 1854.

‡ A Manual of Pathological Anatomy. C. Rokitansky. Sydenham Society.

§ The Cyclopædia of Anatomy and Physiology, edited by Robert B. Todd. London, Sherwood, Gilbert & Piper, 1839.

|| Budd, on Diseases of the Liver. Philadelphia, Blanchard & Lea, 1865.

than men, to be affected with the echinococcus disease.* The reason for their susceptibility has not been explained. Men are usually attacked between the thirtieth and fortieth years of their lives, women between their fortieth and fiftieth years.

The existence of Hydatid tumors in the breast has been doubted,† but several instances of the occurrence of the larva of the *tænia echinococcus* in this gland,‡ place the question of their occurrence beyond the region of doubt.

The term Hydatid tumor, is open to the objection that it is not descriptive of the disease caused by the echinococcus cyst worm. As a general term, parasitical diseases of the breast may be employed; as a special term, and one descriptive of the only species of parasite hitherto observed in the lacteal organs, echinococci of the breast may, with propriety, be substituted.

Echinococci of the breast is a very rare disease. M. Velpeau, in his extensive clinical experience, had never met with a well defined case, and it is probable that many of the cases reported as instances of this disease, have not really been such, but some variety of cyst, in which the parasite, the only positive diagnostic sign, has not been demonstrated, but assumed to exist. They are developed between the ages of twenty-three and forty-three. I am not aware that they have been observed in the breast of unmarried women,§ or in the breasts of men.

* On Animal and Vegetable Parasites. Küchenmeister.

† A Treatise on the Diseases of the Breast and Mammary Region. A. Velpeau. London, Sydenham Society, 1856.

‡ The Diseases of the Breast. John Birkett. London, Longman, Brown, Green & Longmans, 1850.

The Principles and Practice of Surgery. Sir Astley Cooper. Edited by Alexander Lee. London, E. Cox, 1836. Mr. Birkett in *The Lancet*, March 2d, 1867. Surgical Observations on Tumors. John C. Warren. Boston, Cracker & Brewster, 1837.

§ Dr. Warren mentions a case of what he calls "Incipient Hydatid Tumor of the Breast," the cellulous hydatid of Sir Astley

The disease usually begins as a swelling unattended with pain, though Mr. Birkett reports a case* in which, a few months after the appearance of the tumor, the breast became quite painful, and sensitive to the touch. The tumor is hard, but not movable under the skin; at first its surface presents no unevenness, but later, nodules may be felt through the skin; when the sac is very large, it retains its smoothness. The skin covering the tumor is unaffected. The general health remains unimpaired; the absorbent glands are not affected. The tumor sometimes attains an enormous size; Sir Astley Cooper describes one which weighed thirteen pounds; this, however, is exceptional. The tumor may remain small for years, when, without any assignable cause, a sudden enlargement takes place, though even then it is rarely attended with more inconvenience than its size would naturally occasion. The disease has never been known to affect both breasts,† the right is equally susceptible with the left. In some instances the disease has been attributed to an injury,‡ but unless upon the ground of spontaneous generation, it seems difficult to conceive how mechanical means can produce an entozoon; it is probable that the injury has first directed the patient's attention to a disease which already existed, or possibly the injury, by lowering the resisting power of the gland, may have allowed the parasite to locate itself there, but this is improbable, for the echinococcus is a disease in the breast, not of it; it is a foreign body.

Cooper, as occurring in an unmarried woman. *Surgical Observations on Tumors*, p. 207. But it may be reasonably doubted, whether this was a true example of echinococcus. The gland "was filled with little cysts," but these are not said to have contained entozoa, moreover, the echinococcus cyst is generally single.

* *The Lancet*, March 2, 1867.

† Diseases of the Breast. John Birkett.

‡ See reported by Sir Astley Cooper in *Principles and Practice of Surgery*.

The diagnosis of echinococcus of the breast, is in the majority of instances attended with difficulty. In the early stages of the disease, it closely resembles scirrhus, for which it has been mistaken;* when the cyst increases in size and fluctuation can be detected, the tumor resembles any other cystic growth. In making a diagnosis, the most importance should be attached to the unimpaired health of the patient, the irregular increase in the size of the tumor, the natural color of the cutaneous covering, but above all these, the sound which is occasioned by the motion of the parasite within the cyst—hydatid purring;—this, however, is rarely heard. In some instances it is impossible to determine the exact nature of the tumor before an examination of its contents is made.

Echinococci appear in the breast under three forms.†
1. The single cyst, which proliferates endogenously, and contains one or more daughter vesicles and cyst worms. This variety may acquire an enormous size, and is scarcely distinguishable from other cystic growths before its contents are examined. It generally fluctuates in all its parts, and when large is intensely hard and elastic. 2. The multiple echinococcus cyst, in which many small cysts are situated in the gland itself, or in a dense connective tissue, which replaces the gland substance. Until Virchow discovered the animal nature of this tumor, it was classed with colloid growths. Hitherto, it has been found most frequently in the liver, but many of the reported cases of echinococcus of the breast may be considered as belonging to this variety. Their mode of growth seems quite problematical. The small cysts contain the scolices or hooklets of dead echinococci, but rarely, if ever, the living animal. The

* *The Lancet*, March 1st, 1873.

† Sir Astley Cooper describes four varieties of hydatid tumor of the breast, but in his nomenclature he includes some cysts which contain serum only. See *Illustrations of the Diseases of the Breast*, Sir Astley Cooper. Part I. London, Longman & Co., 1829.

theory has been advanced,* that these tumors originate from a single larva which fails to form around it a firm cellular tissue sac. The increasing size of the cyst worm forces it into different directions, and ultimately, these divisions of the cyst divide, or they may remain connected. It is probable that this variety of parasitic disease of the mammæ is more truly a disease than the others, and that however the cysts may multiply, they are a deposit in an already diseased tissue. The multiple echinococcous tumor is distinguished by its unevenness of surface; in the hard tumor, soft, fluctuating spots may be detected. The health is not impaired, the skin covering the growth remains natural. It resembles scirrhus cancer in which cysts are developed, but the general health of the patient will generally prevent an erroneous diagnosis. 3. The single cyst, which has become unable to support life within its walls, and in which only the remains of the parasite are found. This is the barren cyst, the acephalocyst. The exact nature of the growth has been a matter of doubt. Mr. Owen† suggested that it was "gigantic organic cells," and thought that any cell tissue which grew to such a size as to be recognized by the naked eye, should be called an acephalocyst. It is now, however, pretty well established, that these cysts are of parasitic origin. Their objective features do not differ from those of the first variety.

TREATMENT.—Echinococcus of the breast contain the elements for its own destruction, for the extent to which the primary vesicles may be distended by the development of other vesicles is limited, and the inflammation resulting from the irritation of the parasite, may destroy the cyst, and liberate the worm: but the disease is not thereby erad-

* See Letter of Küchenmeister in a Text Book of Practical Medicine. Dr. Felix von Niemeyer. Vol. I. New York, D. Appleton & Co., 1876.

† Lectures on the Comparative Anatomy and Physiology of the Invertebrates. Richard Owen.

icated, for the free scolices will form new enveloping cysts, and thus the disease is repeated. Possibly the second variety of echinococcus tumor may have its origin in a ruptured primary vesicle, whereby many scolices are set free in the gland.

The administration of medicine does not promise much for the removal of echinococcus of the breast, but as the knowledge of medicine advances, probably the surgeon will be able to prevent the growth, or cause the absorption of this parasite by the use of drugs internally; at present, operative interference must be resorted to. It will rarely be necessary to amputate the whole breast, nor is it essential to success to remove all of the cyst; by opening and irritating the cyst, sufficient inflammation will be set up to cause the obliteration of the sac. Mr. Birkett advises the following operation:* If the integuments are thin, empty the cyst of its fluid contents with a trocar and canula. Through this canula pass a grooved probe, after which withdraw the canula. On the probe introduce a probe-pointed bistoury, with which an incision should be made of sufficient length to reach the parent vesicle, and allow the free vesicles to escape from the opening. If the primary vesicle is not discharged at once, and its attachments are too strong to be broken up without causing unnecessary irritation, a piece of lint may be inserted between the enveloping and the primary cyst, and in a few days the remaining portions will slough away. The parts may then be supported with a bandage; perhaps early cicatrization of the surfaces of the cavity would be facilitated, by the application of a firm compress under the bandage.

Electricity is favorably spoken of by some operators. H. Fagge† thrusts two gilded steel needles into the tumor, about two inches apart, and connects both with the positive pole, while he places the negative pole of a con-

* *The Lancet*, March 2d, 1867.

† *The Lancet*, July 18th, 1868.

stant current between the needles, and allows the current to pass for about twenty-five minutes.

Recamier* recommends cauterization as a means for opening the cyst. Different irritating fluids, iodine, etc., have been injected into the cyst, but the practice does not seem to have been followed by success. When the tumor is of the multiple cystic variety, it may become necessary to excise the growth, or possibly amputate the breast.

Chapter III.—Diseases which are associated with the functional activity of the mammary gland, and the generative organs.

§ I. INFLAMMATION.—The tissues of the breast may inflame separately, or the whole breast may become inflamed. The latter condition is the most frequently encountered. Inflammation of the breast generally begins in one structure, but rapidly spreads to the other structures of which the organ is composed. The majority of cases are associated with menstruation, gestation, or lactation, and may either be referred to an increase in the blood supply, an alteration in the constituents of the blood, or reflex nervous action; in any case, irritation immediately precedes the symptoms of inflammation. The course of inflammation of the breast differs in no particular from that exhibited in the inflammation of other organs.

1. *The Nipple*.—Inflammation of the nipple usually occurs during the first month of lactation, especially with primipera. Mr. Birkett believes that the minute follicular glands which are scattered over the nipples, are the structures in which the inflammation is centered. This is probably true, but all the structures of the nipple participate in the disease.

* Clinique Méd. de l'Hôtel-Dieu, 1827.

The causes of inflammation of the nipples are to be sought for in the irritation arising from the pressure of the child's mouth upon the delicate cuticle, or the presence of aphthæ in the mouth of the infant, or possibly the stoppage, with milk, of one of the minute ducts which pass into the nipple. Inflammation originating in the mamilla is rarely confined to that structure during its whole course, but soon spreads to contiguous structures. If not interfered with, the disease generally terminates in fissure or abscess. The fissure is an exceedingly troublesome and painful affection, and the parts, from being constantly bathed with milk, in some cases develop fungous growths, from which oozes an acrid reddish fluid: this is not only injurious to the child, but aids in spreading the irritation of which it is the product. In its most aggravated form, the nipple becomes completely degenerated, and may even slough from the glandular structure. Abscess of the nipple entails much suffering upon the mother, but it is especially injurious to the child. The abscess is liable to be evacuated through the excretory duct of the gland; in this way pus is mingled with the milk which the child receives.

TREATMENT.—Prophylactic treatment may avail much in preventing inflammation of the nipple. During pregnancy, as soon as the nipple begins to enlarge, the parts should be frequently exposed to the air, and bathed with cold water. After birth the milk should be gently washed from the nipple with tepid water and never allowed to dry upon the parts. Inflammation of the nipple can generally be controlled by protecting the parts with a shield, and frequent bathing with tepid water. As a rule, the child should not be permitted to suck from the inflamed nipple, but circumstances may render this precaution impracticable. The medicines which will usually be found of service are: *Arnica*, *Sulph.*, *Cham.*, *Graph.*, *Ignat.*, *Lycop.*, *Merc.*, *Puls.*, *Sepia*, and *Sil.* Fissures and ulcerations should be packed with lint saturated with a weak solution of *Calendula*;

Calendulated Oil, or *Cerate*, will in some instances be found serviceable. Dr. Conant writes us, that he is in the habit of using a dressing composed of equal parts of *Castor Oil* and *Glycerine*; it is very soothing to ulcerated and fissured surfaces. *Graph.*, *Sil.*, and *Sulphur* are frequently indicated. Should an abscess form, too much delay is not advisable before evacuating the pus. Resolution is rarely accomplished, and the purulent matter may cause much damage by burrowing in the intercellular tissue of the nipple. The best direction for the incision to be made is parallel with the lactiferous ducts; care should be taken that these are not unnecessarily injured. It is well to keep the edges of the wound open until all discharge has ceased from the abscess; to this end a small piece of lint may be inserted between the wounded surfaces, as in the treatment of other abscesses. *Hepar, Phy., Sil., Sulph.*, with other remedies, are to be consulted.

2. *Subcutaneous Inflammation*.—Subcutaneous inflammation is situated in the anterior layer of fascia which envelops the gland. Heat, swelling and redness, are present, and the lacteal secretion is in some cases interfered with; only in rare instances is the constitutional disturbance severe. Suppuration almost always follows this variety of inflammation. Usually but a single abscess forms. This is circumscribed and may be situated over any part of the surface of the gland, though usually in the most depending region. M. Velpeau has observed that a single subcutaneous abscess, is unconnected with lactation or pregnancy or with disease of the gland, but depends upon physical or mechanical influences, or upon a general constitutional tendency: and conversely, that multiple subcutaneous abscesses are connected with lactation. The diagnosis of subcutaneous abscess of the breast is not difficult. The gland is not raised from the chest more than in the natural state. The swelling is *upon* the gland. The nipple is normal, unless a high degree of inflammation and swelling exists, when it becomes somewhat depressed. The

pus shows a tendency to make its way towards the gland quite as frequently as it does towards the skin, thus rendering necessary an early use of the knife.

The causes of subcutaneous inflammation are numerous. Anything which gives rise to irritation of the skin covering the breast, may be considered as an exciting cause, to perhaps an already existing predisposition.

3. *Submammary Inflammation.*—Submammary inflammation is seated in the layer of cellular tissues which separates the mammary glands from the pectoral muscles. It is probable that this tissue contains, if it does not secrete, a serous fluid, the office of which is to facilitate the motion of the gland upon the chest during the respiratory act; M. Nélaton describes it as the cellular bursa. From the deep situation of the submammary tissue, and the physiological office which it performs, it is evident that inflammation of this tissue will be followed by certain well-marked objective symptoms. The constitutional symptoms are severe, and suppuration will occur early, and result in a copious secretion of pus. The affection is, in rare instances only, primary, but generally originates in deeper structures, or in the gland itself. There is generally a high degree of fever and great swelling of the breast, which looks as if raised from the chest, and when touched, if the disease is far advanced, feels as if supported on a bag filled with some fluid. The skin is hot and tense, and the veins swollen. The pains are mostly dull and heavy. The formation of pus, as in other situations, is indicated by severe chills and throbbing pains. The tissue in which the inflammation is centered, being situated upon the pectoral muscles, every motion of the arms causes considerable pain. The breast is pushed forward, and if the collection of pus is large, there will be a bulging around the base of the gland. From the unyielding nature of the tissues in front of the abscess, the pus by burrowing may give rise to serious complications. It has been known to work its way between the meshes of the gland, downwards, or in the direction of

the neck or axilla, or even through the walls of the chest, causing disorganization of the costal cartilages, and intercostal muscles, and finally empty into the cavity of the plura. Such instances are fortunately rare. The progress of submammary inflammation is very rapid; large abscess form in three or four days, but the pointing of the abscess is slow. When they open externally, it is usually at several places around the periphery of the gland; if the pus burrows between the lobules of the gland, it may discharge itself near the areola, because at that point the gland tissue is the thinnest. Resolution is usually delayed, the severity of the symptoms having caused too much destruction of tissue to ensure so formable a result.

The inflammation is usually circumscribed, rarely extending beyond the margin of the sac formed by the union of the deep and superficial tissues in which the gland is held. The causes of submammary inflammations are, in many instances, inflammations of the gland structure, which readily spreads to the submammary fascia, processes of which pass into the gland and divide it into lobes; arrest of lactation, and the subsequent formation of milk lumps, diseases of the chest, pleurisy, or injuries of the ribs.

4. *Parenchymatous Inflammation; Mazoitis* *—Parenchymatous inflammation is situated either in the gland tissue, or in the cellular tissue, between the lobes of the gland. Although there may be a physiological difference between these two varieties of inflammation, clinically, it is impossible to distinguish between them. One or more lobes may be affected. There are present shooting and throbbing pains, extending into the axilla. The glands of the axilla are sometimes enlarged and painful. The secretion of milk is diminished or wholly suspended. At first, upon manipulation, a firm, hard tumor is discovered; as the disease progresses, and several lobes become involved, the swelling presents a nodulated surface to the touch.

* Diseases of the Breast. John Birkett.

The constitutional symptoms are usually severe; the local disturbance is very liable to result in suppuration.

Parenchymatous abscesses arise deeply within the vesicles of the milk tubes. M. Velpeau has observed fifty-two in one breast, but this is an unusual number. They succeed each other rapidly, but so many are rarely found at one time. Their progress being slow, sometimes three or four weeks are consumed before they reach maturity. The cure is much retarded, for as one abscess heals, another forms. In some instances there is extensive sloughing of the tissues which cover the abscesses, the bottom of the cavity being exposed to view; sometimes several collections of pus open into each other.

A variety of glandular abscess which deserves mention is the *shirt-stud abscess*. A collection of pus forms in the glandular tissue, and another abscess which may arise separately, forms in the submammary tissue. By burrowing, these are united, thus forming one abscess, the two parts of which communicate by a canal, having a secreting surface. This variety has also been called *dumb bell abscess*.

In its results, mastitis is considered the most serious form of inflammation which attacks the breast. Not alone does the child suffer, if the disease accompanies lactation, but the organic changes which take place in the gland when suppuration supervenes, are highly favorable to the permanent degeneration of cell type, and the production of conditions advantageous to the localization of a constitutional disease.

Parenchymatous abscesses not unfrequently, if allowed to open spontaneously, leave fistulous openings in the gland, which prove very intractable to curative measures. The causes of mastitis are almost always associated with lactation. The congestion natural at such times may proceed to inflammation, or through an abundance of milk, or failure on the part of the child to withdraw a sufficient amount, the veins and lacteal ducts become distended, thus causing irritation and inflam-

mation. Mazoitis sometimes accompanies the establishment of the menstrual flow, or injuries received upon the breast.

5. *Lymphatic Inflammation*.—M. Velpeau was the first to describe inflammation of the lymphatic vessels of the breast. The redness is confined to small patches, or appears in streaks leading from the breast to the armpit, which correspond with the course of the lymphatic vessels. On the red striæ are painful spots, which form the foci of the disease. The constitutional symptoms are severe. There are chills, a rapid pulse, restlessness, loss of appetite and of sleep. The breast is very painful, and there is much heat and swelling of the parts. The redness, after the first few days, gives place to a dull copper color.

Lymphatic inflammation, more than inflammation of other structures of the breast, may, with reasonable assurance, be expected to terminate in resolution, and even when pus does form, the abscesses are very amenable to treatment. The abscess is situated superficially, is not delayed in pointing, and generally heals rapidly, even when allowed to open spontaneously.

6. *The Chronic Abscess*.—The chronic or cold abscess, is developed in an induration of inflammatory lymph cells, which has existed for some time. The formation of such swellings may or may not be preceded by inflammatory symptoms; the metamorphosis of lymph cells into pus cells, is probably always attended with inflammatory symptoms. Clearly it is a misnomer to call them abscesses, chronic or cold, for the abscess only dates from the time at which suppuration occurs; the induration which precedes the appearance of pus, is chronic, but the abscess is acute; secondary abscess would be a better term by which to designate these swellings.

The first symptom observed is a hard lump in the breast, generally situated deeply, accompanied with pain, or sensitiveness. These tumors occur most frequently in

early life, and often during suckling. Probably a milk duct becomes obstructed, and the irritation of the confined fluid causes sufficient congestion for the effusion of lymph, or an abscess may arise from the metamorphosis of caseine cells. A scrofulous diathesis is favorable to the collection of these ill-organized tumors.* These swellings may continue for years without change in size, but they generally terminate in suppuration, resolution being a rare event. The suppurative process is attended with the symptoms which usually accompany the formation of pus. There is, apparently without any cause, a sudden alteration in the inactive swelling. The breast increases in size, becomes painful, and finally an abscess points, generally near the nipple. After the opening of the abscess, the bottom of the cavity sometimes puts on a fungous appearance, the general health suffers, and other abscesses form near the first one. The healing of the chronic abscess is somewhat delayed, for the surrounding tissues suffer from the long continued morbid condition which precedes the formation of pus. If the lymph tumor is very slow to develop into an abscess, not unfrequently a cyst is formed around it, from the same cause which develops the enveloping cyst of *cestoidal* irritation. When suppuration occurs in the tumor, the suffering is much increased from the unyielding nature of the cyst wall.

The diagnosis of chronic abscess, is sometimes a matter of considerable difficulty. The tumor in which they arise may be mistaken for scirrhus, and frequently the supervention of suppuration, and subsequent opening of the abscess, present many symptoms which closely assimilate medullary cancer. The history and constitutional symptoms, if carefully examined, will generally lead to a correct estimate of the nature of the disease.

* Dr. Warren (Surgical Observations) reports several cases of chronic abscess under the name of "scrofulous tumors."

TREATMENT OF INFLAMMATION AND ABSCESS OF THE BREAST.—The normal congestion of the breast, attendant upon the establishment of lactation or other natural functions, is usually transient, and will require no other treatment than such hygienic precautions as reason dictates; but if the congestion proceeds to inflammation, prompt treatment is called for. The nature of this will depend upon the exciting cause of the inflammation. If distention of the lacteal tubes with milk is the exciting cause, the child should early be given the breast, or when this is not possible, from the death of the child or deformity of the nipple, mechanical means for removing the milk are to be substituted; many breast pumps have been devised, but with few exceptions, they add to the irritation against which they are employed. The method which has proven the most useful in our hands, is easy of construction and possesses the advantage over other methods, of producing a gradually increasing and continuous suction. A quart bottle is to be selected, having a nozzle large enough to receive the whole nipple, but no portion of the areola. The method of application is as follows: Place the bottle in boiling water, and after the air which it contains has become expanded—to accomplish this only a few minutes will be required—the nozzle of the bottle is fitted to the nipple. The cooling glass causes contraction of the air within the bottle, and thus suction is produced. To avoid undue heat of that portion of the bottle which comes in contact with the breast, the water in which the bottle is placed should not cover its neck. Sometimes so much pain is caused by this method, that the suction can only be continued a few minutes at a time. In removing the bottle care should be exercised that the nipple sustains no injury. If the suction is very great, warmth may be applied to the bottle; this will facilitate its removal. The practice adopted by some surgeons, of rubbing the breast from the periphery towards the nipple in the early stages of inflammation, is inexpedient, for thereby unneces-

sary irritation is produced. This manceuvre may be of service in dispelling lumps which form in the breast. To perform it the hand should be well smeared with linseed or olive oil, the pressure be gentle but firm. If the breasts become very sensitive to pressure, they may be protected with a shield, or any other contrivance which prevents the clothing from rubbing upon the inflamed parts.

When the inflammation arises from an injury, the parts may be bathed with *Arnica* ; or with *Calendula*, if there is a solution of continuity of the tissues. Applications of moist heat, long continued, will frequently prove a valuable adjunct to the internal administration of medicines. It is the custom of some surgeons to bathe the parts with the diluted tincture of the medicine which they prescribe to be taken, but we do not understand the principles upon which such practice is founded, and believe that if the remedy is well selected, it will act promptly, without the aid of the external application.

The following medicines will be found useful, administered according to their symptomatic indications: *Acthusa cyn.*, *Apis.*, *Arnica*, *Bellad.*, *Cist.*, *Conium*, *Graph.*, *Hamam.*, *Helonias dio.*, *Hepar. s. c.*, *Lycopod.*, *Merc. sol.*, *Phosph.*, *Phytol.*, *Rhus tox.*, *Sang.*, *Silicia*, and *Sulph.*

When the efforts to accomplish resolution have failed, and the surgeon is able to detect the presence of pus, it is generally advisable to open the abscess, and such medicines as *Hepar* and *Silicia* may be administered to hasten the pointing process. A flaxseed poultice may be of service when the pus is deeply situated, but unless urgently called for, its use should be avoided, for its application reduces the vitality of the tissues. We cannot but consider the efforts to cause the absorption of pus as of doubtful utility. For first, pus as pus, is never absorbed, the pus cell breaks up, and the fluid elements only are taken into the circulation. These are probably injurious, the more solid constituents remain in the breast, where they are liable to form a nucleus for some more serious disorder ; and

second, the pus burrows through the cellular tissue which unites the lobes of the gland. The incision may be made in any portion of the breast, its location corresponding with the point at which the integument appears to be the thinnest. This will generally be found at the most dependent part of the abscess. One incision will usually suffice, but the surgeon should not hesitate to cut whenever the integument seems discolored, and he suspects matter to be collected. The incision may be from a quarter, to one inch and a half in length; the object is to give *free* exit to the pus. The opinion of surgeons differ concerning the direction which should be given to the incision. M. Velpeau* recommends a perpendicular incision, believing that such a one closes less readily than a longitudinal opening, thus allowing the cavity to heal from the bottom. Mr. Ferguson, *au contraire*, advocates the longitudinal incision, for the reason that thereby the milk ducts are less liable to be injured. This is a weighty consideration, but it is probable that less injury follows the perpendicular incision than at first might be supposed, for with the swelling of the breast the milk ducts are diverted from their natural course, and an incision in one direction is about as liable to penetrate the lacteal ducts as an incision in an other direction. If sinuses are found to run out from the abscess cavity, each one must be laid open, by first passing a director through its whole length, and cutting with a bistoury from within outwards. We believe this to be the only radical cure; packing with the sulphate of zinc and other irritants, has in our hands resulted in a failure to establish a cure.

Some surgeons have proposed to evacuate the pus by means of the canula and trocar. This method is mainly useful when the abscess is submammary. If the pus is situated deeply, and evacuated with the knife, troublesome hemorrhage is liable to occur; in such an event ice may be

* Diseases of the Breast. A. Velpeau.

applied to the parts, or if this fails to arrest the bleeding, the opening must be enlarged, and the bleeding vessel secured. It is well to place in the line of the incision a dossil of lint, smeared with simple *Cerate*, to prevent the lips of the wound from uniting before the surface of the abscess has ceased to suppurate. Much suffering will be avoided if the breast is suspended. This may be accomplished either with adhesive straps or with a sling passed around the neck. With the adhesive plaster the patient is at liberty to move about. The sling is better adapted to patients who are confined in bed. If the abscess is associated with lactation, and there is reason to suspect that the purulent collection opens into one or more of the milk ducts—and to this end the milk should frequently be subjected to careful analysis—suckling must be discontinued, and the milk carefully drawn from the breast with a pump. Rest in a recumbent position is usually advisable for a few days after the opening of a mammary abscess, and the parts should be well supported until all signs of irritation have disappeared. The medicines are the same as those already given for inflammation. Much reliance may be placed upon *Hepar*, *Phytol.*, and *Silicia*; the two former especially, control the suppurating process.

§ II. LACTIFEROUS FISTULÆ consist in an abnormal communication between the skin and a lacteal tube. The walls of this canal are indurated, and present very much the appearance of the walls of a chronic abscess. They are composed of highly organized lymph cells and granulations, from which the pus cells are derived. There is always a discharge from the external opening. This discharge during lactation, consists of milk, with which is mingled a small proportion of pus cells; at other times the discharge is thin and watery. Lactiferous fistulæ originate in suppuration of the mammæ, or in some injury done to the gland. An abscess by burrowing forms long

sinuses, and these may, subsequently, open and not heal : or in opening an abscess of the breast, the knife is not unapt to sever a milk duct, and these show little disposition to unite after the abscess has ceased to discharge. Accidental wounds, as from stays, may also give rise to fistulæ of the breast.

TREATMENT.—Lactiferous fistulæ sometimes prove very intractable to treatment, especially when associated with lactation. The natural determination of blood to the breasts, attendant upon that function, is opposed to the healing of the abnormal canal, and, contrariwise, if the milk is not removed from the breast by the natural opening, it will be forced through the abnormal canal from the particular duct with which this communicates, the remaining portion of the gland continuing engorged. We are disposed to consider it advisable to remove the milk by artificial means, for the child's hands, by unequal pressure, favor the continuance of the fistula. They not infrequently heal spontaneously, after lactation ceases. M. Velpeau has seen several cases of this kind. The fistula may be packed with dry lint, or dry lint saturated with *Carbolic acid* $\frac{1}{10}$, or *Salicylic acid*, in the same proportion. This method has sometimes been successful. With all these means, pressure, not severe, should be employed. The pressure is conveniently maintained by means of compresses, over which broad adhesive straps are passed, care being taken that by the pressure, the walls of the canal are approximated, and held in that position. If all other means fail, the fistula must be laid open on a director, and treated as an open wound. The surgeon should first ascertain the direction of the fistula, and by comparing this with the probable direction of the lacteal ducts, he is able, in a measure, to avoid wounding them. The following remedies will be found of service : *Puls.*, *Sil.*, *Lycopod.*, *Calc.*, *Assaf.*, *Carb v.*, *Bellad.*, *Nitric acid*, and *Conium*. Among the new remedies are mentioned, with especial emphasis, *Hydrastis*, and *Phytol.*

§ III. GALACTOCELE.—Tumors formed of milk, or of some of its constituents, occur either as dilatations of lacteal ducts, or as infiltrations of the substance of the gland. M. Velpeau seems to have first called attention to the nature of this tumor, and he was of the opinion that they are not as rare as they are generally thought to be. These tumors, called by Sir Astley Cooper lacteal or lactiferous swellings, are always dependent upon pregnancy. They may occur at almost any time subsequent to lactation, in some instances appearing a few weeks, in other instances many months after confinement. They rarely attain a large size—the noted case related by Scarpa, in which the breast hung down to the thigh, is an exception. When a galactocèle occurs in the early days of lactation, marked inflammatory symptoms are present. The whole breast swells, and the skin is red and shining, or the swelling and discoloration may be circumscribed. The breast is soft and fluctuating, somewhat flask-shaped, sometimes lumpy. Milk tumors, however, are generally unattended with symptoms of inflammation, appear gradually, and occasion no inconvenience save that which arises from their size and weight. As the tumor becomes chronic, its contents harden. The watery elements of the milk are absorbed, the more solid parts remain, and an enveloping cyst is formed from the mammary tissue, in which isolated condition, the tumor may remain inactive for years, though cases are reported in which milk swellings, after continuing dormant for many years, have taken an inflammatory action, and all the phenomena of acute milk abscess been experienced.

It is not unusual to find concretions and granules in milk tumors, which from their hardness have been called milk stones. In one case, they are said to have given rise to an audible noise, by striking together when the patient moved. In some instances, the contents of the tumor disintegrate into a liquid purely serous; generally the tumors are solid,

made up of the creamy or cheesy substances which remain after the absorption of the fluid elements of the milk.

The etiology of lacteal swellings is identical with certain phenomena connected with lactation. The congestion which attends the secretion of milk, may, from a slight cause not easily determined, become increased in one of the acini of the mammæ, and this acinus is thereby stimulated to undue activity, and secretes a larger quantity of milk than can be carried away by the duct, its natural means of exit. The partially stagnant milk becomes by absorption thickened, and accumulating, distends the acinus, until its muscular walls are paralyzed, and no longer able to exert the force necessary for the expulsion of the fluid. Here are all the conditions essential for the formation of a lacteal tumor. The minute lacteal duct in time, is completely closed, and a cyst, containing milk, exists in the place of the acinus in which it originated.

The *diffuse galactocèle* does not differ essentially from the circumscribed variety. The over-distended sac is ruptured either by a blow, or thinning consequent upon the pressure from within, and the gland tissues become infiltrated with milk.

The diagnosis of galactocèle is sometimes quite difficult. From abscess of the mammæ, it may be distinguished by the usual absence of inflammatory symptoms. In chronic abscess the base of the tumor is larger than is the case with galactocèle. From an ordinary cystic growth, a diagnosis can only be made by considering the history of the case. The removal of a milk tumor is generally followed by a complete and permanent cure; there is, therefore, but little danger of confounding it with a malignant growth. This, however, does not seem to have been true of a case reported by M. Velpeau. After removing what appeared, according to the analysis of M. Donné, to be a milk tumor, the contents of which had hardened, he was surprised to find at the end of a month, and before the wound was entirely healed, another

tumor in the place of that one which he had excised. The second growth continued to increase in size until the whole breast was involved. Fungous growths were developed, extensive suppuration ensued, and the patient finally succumbed to the disease. The opening which follows the spontaneous discharge of a milk swelling, is rather difficult to heal, and this difficulty increases in direct ratio with the length of time which the tumor has existed. Generally a fistula is formed, which continues months and even years.

TREATMENT.—The treatment of lacteal tumors, must vary with the acute or chronic nature of the affection. If the disease is of recent origin, and lactation continues, it will probably be necessary to stop the secretion of milk, for so long as this continues, the swelling will increase in size. In general, operative measures have been found necessary to effect a cure. It has been proposed to treat galactoceles after the method of treating hydrocele, but the results of opening the tumor with the trocar, and injecting some stimulating fluid, have not been satisfactory; possibly this is because the lining of a lactiferous tumor partakes more of a mucous than of a serous character. The use of a seton has been attended with more gratifying results; but little inconvenience arises from its presence, and its introduction is attended with no danger. Or an incision may be made, and after the contents of the cyst have been evacuated, the wound kept open with a tent or pledget of lint. If the tumor is solid, it should be excised, care being taken to avoid wounding the breast unnecessarily. When "cakes" form in the breast, and the surgeon has reason to believe that they are caused by the closing of a lacteal duct, gentle pressure from the base of the breast towards the nipple, will frequently force open the closed tube, and establish a natural flow of milk. The medicines which will be found useful, are: *Bellad.*, *Bryonia*, *Carbo v.*, *Cist.*, *Clem.*, *Sepia*, *Phyt.*

Chapter IV.—Diseases characterized by an abnormal growth of the gland tissue, or an increase in the number of the histological elements of the gland.

§ 1. Production of a structure, to an extent at variance with the typical formation of the body. HETEROMETRIA.

1. *Hypertrophy*.—The normal type of the tissues of the body is acquired and maintained by the healthy performance of three functions, *viz.*, development, growth, and assimilation. Until a certain period in the life of the individual, development and growth proceed together, but when a part has attained that structure which is most convenient for the performance of its function, development is arrested, and the part either increases in size by the addition of material similar to that of which it is already composed, or it maintains its status, by a regular formation of like material, to take the place of that which in the ordinary course of life is impaired, or dies, and is cast off.

Hypertrophy, excessive growth, is not always to be ranked among diseases. The great correlative law of nature, is, that within certain limits, each organ of the body meets the demand made upon its strength. The skin upon the soles of the feet and palms of the hands is thicker than in other parts of the body; the arm of the laborer is larger than the arm of one who is unaccustomed to labor, but in such cases the increase in size is exactly similar to that which in other cases may justly be considered a disease. The dividing line between physiological and pathological hypertrophy is in some instances difficult to demonstrate. In general it may be said, that when a part increases to a size greatly disproportionate to the other parts of the body, without a corresponding increase in the functional activity of that part, disease is present: but, on the contrary, when a part—for example the heart, if an obstruction is offered to the distribution of blood through the system—acquires an unnatural size, and with the enlargement gains addi-

tional strength and capacity of action, the part is not diseased, its size is a compensation for some other disease which calls for increased activity of the hypertrophied organ.

The histology of hypertrophy, in no instance differs from the minute anatomy of the organ in which the disease occurs. Any one of the tissues of an organ may become hypertrophied, or the whole organ may enlarge. Some tissues, the fibrous and fatty, show when hypertrophied, a disposition to assume a circumscribed form, and take on the appearance of a tumor, but if the fibrous tissue of a part in which fibrous tissue is normally formed, attains an unnatural size, it is a true hypertrophy, as truly so as when the whole organ enlarges.

Pathologists are not agreed as to the exact nature of hypertrophy. Some microscopists, as Harting,* assert, that there is no numerical increase in the hypertrophy of muscular fibres, referring to the heart, while G. Schmidt† stated, that new muscular fibres do arise when the bulk of muscles is increased. Mr. Paget favors the latter view. It is not improbable that both conditions obtain even in the same growth, and as these frequently pass into each other,‡ the simple and numerical hypertrophy—hyperplasia—may be considered as one pathological condition.

Hypertrophy can always be traced to errors of nutrition; these are threefold:—1. The increased exercise of a part in its healthy functions. 2. An increased accumulation in the blood of the particular materials which a part appropriates for its nutrition or secretion. 3. An increased afflux of healthy blood.

The physiological changes through which the breasts pass before and after puberty, are well calculated to induce any one of these conditions, which, within certain limits, are healthful, but the equilibrium of the system is

* *Recherches Micrométriques*, 1845.

† *Virchow's Archives*, 1859. XVIII.

‡ *Manual of Pathology*. Ernst Wagner.

easily disturbed. Married life and pregnancy seem to exert little influence upon hypertrophy of the breasts, for disease occurs with nearly equal frequency in maidens and mothers. We may therefore conclude, that lactation is rather opposed than otherwise, to this disease. If, during lactation, an unusual quantity of blood terminates in the breasts, it is utilized in the secretion of milk, which, if profuse, commonly flows away when not required by the child, and so relieves the congestion of the breasts. At puberty and at each subsequent menstruation, the unusual flow of blood to the breasts is not removed save by absorption, and the latter process is frequently defective.

It will be convenient to make four divisions for the consideration of hypertrophy of the breast :

A. Hypertrophy of the skin and subcutaneous connective tissue, called also *elephantiasis*.

B. Hypertrophy of the gland tissue.

a. General glandular hypertrophy.

b. Lobular imperfect glandular hypertrophy.

C. Hypertrophy of the adipose tissue.

D. Hypertrophy of the fibrous tissue.

A. HYPERTROPHY OF THE SKIN AND SUBCUTANEOUS CONNECTIVE TISSUE.—Two varieties of elephantiasis have been described by authors—*E. Græcorum*, *E. Arabum*. Their pathology and history seem to be sufficiently dissimilar to allow of their recognition as two distinct diseases. It is, therefore, with much reason that Mr. Morehead,* following the usage in India, restricts the term elephantiasis to that disease which is characterized by an excessive imitation in general structure of the outer compact layer of the cutis, and describes the so-called *E. Græcorum* under the appellation, leprosy.†

* Clinical Researches on the Diseases in India. Chas. Morehead. Second edition. London, Longmans & Co., 1860.

† Mr. Erasmus Wilson (Diseases of the Skin. Philadelphia, Lea & Blanchard, 1865) believes that the only true elephantiasis is the

Elephantiasis was probably first observed in Arabia, and has been more prevalent in that than in other countries, but at the present day the disease is less frequent in Arabia than in certain parts of India—as the lower provinces of Bengal, and particularly along the coast of Malabar. No country is absolutely free from elephantiasis.

The origin of elephantiasis is somewhat obscure. The majority of cases may reasonably be attributed to oft-repeated attacks of inflammation, but there is something peculiar, something specific, in this inflammation, the nature of which is to produce induration rather than supuration. The endemic character of the disease, its prevalence in the tropics, and the almost complete immunity which the inhabitants of colder climates enjoy, the susceptibility of certain tissues to be attacked, also point towards a specific origin. Elephantiasis is probably a blood disease, dependent upon the introduction into the system of a peculiar spore, which is generated by certain atmospheric or climatic conditions. It is further probable, that the hypertrophy of the subcutaneous cellular tissue is not dependent alone upon an increased vascularity or hy-

E. Græcorum, or leprosy. He describes three diseases, which among other authors are comprised under the two names already given. Elephantiasis, having for its synonyms *Lepa Arabum*, *Lepa Judæorum*, *Lepa Mediacri*; *Bucnomia*, or Barbadoes leg, having for its synonyms, *Elephantiasis Arabum*; *Lepa*, having for its synonym, *Lepa Græcorum*. The confusion arising from this nomenclature is an unnecessary addition to that which already exists in pathology. Leprosy and Barbadoes leg are perfectly distinct diseases, and Barbadoes leg may more properly be restricted to a special form of elephantiasis, for, unquestionably, the same pathological phenomena occur in other parts of the body—notably, the genital organs of both sexes. Therefore, it seems expedient to employ one general name to describe a certain pathological condition; special names may be given according to the part affected. Elephantiasis conveys a correct objective impression of the cutaneous hypertrophy described in the text. The great size to which these growths attain, and the general appearance of the diseased part, bear a striking resemblance to the tegumentary covering of an elephant.

pernutrition of the part, for there seem to be strong reasons for believing that the primary change is in the lymphatics. It has been supposed that the excessive use of fermented drinks is favorable to the development of elephantiasis, as wine and beer are of gout; but this may be questioned, since in countries where fermented liquors are the most used, England, Germany, America, the disease is very rare.

Hypertrophy of the tegumentary covering of the body is accompanied with an effusion of the liquor sanguinis, the result either of inflammatory action or disease of the lymphatics, into the interstices of the affected structure which subsequently takes the form of lowly organized fibrous tissue. The connective tissue is increased in quantity, and its fibres are enlarged. The stratum corneum is also hypertrophia; Kapasi locates the principle hyperplastic changes in this structure.*

The disease is first recognized by repeated attacks of pain in the part which is to suffer, and general fibrile excitement. The parts become red, swollen and hot, and the lymphatics leading to the nearest gland, are sometimes tense and hard. These constitutional and local symptoms usually disappear in a few days, with the exception of a slight degree of hardness where the disease is centered. At irregular intervals similar phenomena are repeated, always attacking the part first affected. After each attack the tissues remain more tumefied and enlarged, until finally their size is enormous. In some instances, when the hypertrophy has made a certain progress, the attacks of inflam-

* Mr. Paget considers elephantiasis as a "cutaneous outgrowth" (Surgical Pathology). The disease is an outgrowth only in some instances. The name implies something which grows from, and commonly no boundary can be assigned to elephantiasis; it is more an infiltration than a separate growth. The mass, however, may assume a variety of shapes; to such tumors as are characterized by a pedicle, or which seem to be separated from the surrounding tissues, the term cutaneous outgrowth may with propriety be applied.

mation become less frequent, or wholly cease to occur, but the increasing dimensions of the part are insured by a constant effusion of lymph. Latterly the cutaneous covering assumes a pale yellowish or livid color, and often becomes scaly, rough, or fissured. Soft vegetations, which manifest a disposition to ulcerate, spring from the fissures. As the disease progresses, deep-seated suppuration, from which flows an offensive discharge, occurs in different places of the mass, and sometimes in the neighboring lymphatic glands. In the most aggravated forms of the disease, extensive sloughing is not rare.

Sections of the growth show the epidermis and cutis to be thickened to the extent of half an inch or more. The subcutaneous tissue is also hypertrophied, and sometimes in its areolæ is found a semi-liquid gelatinous substance, or the whole may be solid, glistening, yellow, like udder. Sometimes the veins are obliterated, though the arteries are usually very large. Hence when an attempt is made to extirpate the mass, profuse hemorrhage is generally to be expected. The principal nerves present a white flattened appearance, and are somewhat enlarged.

The parts of the body most obnoxious to elephantiasis, are the lower extremities, and genital organs; indeed it has been considered very doubtful whether the disease ever attacked other portions of the body,* but though extremely rare, undoubted cases of elephantiasis of the breast have been reported. The breasts acquire an enormous size, their surface becomes hard and rugose, the nipple may wholly disappear, and deep ulcerations are found wherever the skin is folded upon itself. The disease may, secondarily, prove fatal from extensive suppuration and sloughing. In other localities than the breast, elephantiasis is more common in men than in women—I am not aware that it has ever been found in the male breast—it is

* Diseases of the Skin. Henry G. Piffard. London and New York, Macmillan & Co., 1876.

rare before the tenth year, and most frequent between the age of puberty, and the thirtieth year of life.*

TREATMENT.—Operative measures promise little for the cure of hypertrophy of the subcutaneous cellular tissue. The breast may be amputated, but the operation is difficult and dangerous, for the growth is not well defined, and is generally very vascular. The subclavian artery may be ligated,† but by anastomosis the breast would still be supplied with blood, and furthermore it is not positive that the blood is the source of error. Elephantiasis is a constitutional disease, and can only be cured by the remedy in homœopathic rapport with it. The diet should be carefully regulated, and if there is reason to believe that the disease is of telluric origin, a change of residence is quite imperative. Perhaps much may be accomplished by securing the proper drainage of the land. Pressure in the form of strapping will prove a valuable adjunct to medical treatment. The medicines which will in some cases be found of service, are: *Ant. crud.*, *Dulc.*, *Graph.*, *Rhus tox.*, *Sepia*, *Silicia*, and among the new remedies: *Ars. iod.*, *Guaræa tric.*, *Plantago maj.*, *Stillingia syl.*

B. HYPERTROPHY OF THE GLAND TISSUE.—The secreting structure of the breast may become enlarged without a corresponding growth of other structures; the superficial coverings of the gland are sometimes diminished in thickness, from the stretching to which they are subjected by such an enlargement. In true hypertrophy of the gland, probably there is no increase in the number of acini, but that these attain an unnatural growth, is quite certain.

* Diseases of the Skin. George Naylor. London, Churchill & Sons, 1866.

† The femoral artery was first ligated for elephantiasis of the leg, by Dr. Carnochan. (*New York Journal of Medicine*, Sept., 1852.) Compression was first employed on the femoral artery for the same disease, by Vanzetti. (*Gaz. des Hopitaux*, No. 144. 1867.)

The whole gland in some instances suffers enlargement; in others, only one lobe is hypertrophied.

These conditions will be considered separately.

α. GENERAL GLANDULAR HYPERTROPHY.—This affection depends upon a uniform increase in the number or in the size of the cellular elements which compose the mammary gland. Dr. Fingerhuth distinguishes two forms of general hypertrophy of the *mammæ*.* One variety occurs at the age of puberty, and runs its course rapidly; the other variety is chiefly connected with disturbance in the functions of the generative organs,† but it may be questioned whether such a distinction is allowable, for inasmuch as the first variety is also associated with menstrual irregularities, rapidity of growth constitutes the only difference between it and the second variety.

General hypertrophy of the *mammæ* is a disease of early life; it most frequently occurs about the age of puberty, but sometimes is not observed until after pregnancy. There is rarely much pain, though the initial stage is occasionally preceded by a pricking sensation in the affected organ. The menses are either suppressed or irregular, and about the period of the expected menstruation, the breasts rapidly augment in size and sometimes become quite sensitive, but none of these phenomena are constant; the gland may enlarge gradually, unaccompanied with painful symptoms. The general health is never disturbed, unless extensive ulceration occurs.‡ The integument covering the tumor presents a healthy aspect, the superficial veins may suffer enlargement, less frequently the

* British and Foreign Medical Review. 1837, Vol. IV.

† For illustrated cases, see also: Diseases of the Breast, John Birkett.

‡ Several cases have been reported by Mr. Birkett, Dr. Fingerhuth and others, of hypertrophy of the *mammæ*, in which the general health seemed greatly undermined, but we suspect that these have not been true examples of mammary hypertrophy, but heterologous growths.

whole skin assumes a dark brown hue. Mr. Liston describes an enlargement of the left mamma.* A general blue, or slate color, which disappeared during pressure, characterized the entire surface of the breast. Above the nipple there were several blue nævus-like spots. These discolorations were probably caused by an effusion of blood into the superficial structures of the breast, and may be present in any case where there has been much congestion.

Though the breasts may attain an enormous size,† in one instance measuring twenty-six inches in circumference, and weighing twenty-nine pounds, the body does not suffer emaciation. The hypertrophied mamma sometimes assumes a polypoid shape, the gland seems to become separated from the pectoral muscles, and forms a long pendulous tumor, narrowed at its base. The enlargement has been known to disappear spontaneously upon the establishment of the menstrual flow, or after pregnancy; or continuing to increase, the excessive growth can no longer be nourished, and ulceration from poverty of nutrition, attacks the superficial structures, sloughing and sphacelus follow, and the patient finally succumbs to the disease, exhausted from the profuse discharge of pus, and the resulting constitutional disturbance. Both glands are usually affected, though not always simultaneously; the right gland is quite frequently larger than the left, which, perhaps, receives an explanation in the hypothesis that the right side of the body is more perfectly developed than the left side.

The histological anatomy of a hypertrophied mamma differs only slightly from that of the healthy organ. No new elements are developed, and there are absolutely no changes in the organ, save such as are due to an increase in the size and number of the normal constituents of the

* Medico-Chirurgical Transactions. 1847, Vol. XII.

† See the case of Charlotte Russell, reported in the *American Journal of Medical Sciences*. Vol. XXVIII, Aug., 1834.

part. The gland is healthy, and when pregnancy occurs is able to perform the office of lactation. Complications may ensue, but these are the diseases which attack the healthy mammæ.

The hypertrophied is more susceptible to disease than the normal gland, because the *sanity* of the organ is impaired; but it is a source of wonderment that these great masses of overgrowth are not more frequently diseased than we find them. When the breast is very large, cysts containing serum have been known to form in its parenchyma.* These arise from the closing of a lactiferous duct, and subsequent effusion of serum into the cavity. They do not embarrass the diagnosis, for they form in the already diseased structure, and therefore, may easily be recognized as secondary growths.

The causes of hypertrophy of the mammary gland are such as would induce hypernutrition of that organ. At puberty the breasts, physiologically, enlarge; the ovaries, with which the breasts are in acute sympathy, become functionally active, and that exquisite harmony, which throughout healthy nature exists between the demand and the supply, is very easily interrupted, so that the breasts may remain permanently congested and their tissues over-nourished. Or the reciprocal relation between the mammæ and other organs may be so deranged that the breasts receive too much pabulum. This is perhaps one of the most recondite matters with which the physician or surgeon has to deal, and his most careful study not infrequently ends in a failure to ascertain the organ in which the alteration of the normal condition of the blood has its origin. The sudden suppression of the menses is sometimes followed by enlargement of the breasts, and if this irregularity is not speedily corrected, permanent hypertrophy is liable to result. Sexual irritation has been known to provoke enlargement of the mammæ; this is especially true of lobular hypertrophy.

* *Medico-Chirurgical Review*, 1833. Vol. XIX.

TREATMENT.—In its incipiency, hypertrophy of the mammæ is amenable to the action of medicines, but it may be questioned whether, after the gland has attained a large size, it is advisable to rely wholly upon such treatment. Of course the menstrual functions should be regulated, and every indication met with the proper medicine; but if after this there remains hypertrophy of the gland, it is best, considering the diseases to which it is obnoxious, to remove the enlarged part. This is the last resource, but frequently it will be the only one at the command of the surgeon. The whole gland is to be extirpated, and the disease will not return. Circumstances, as in other cases, will modify the course of treatment to be pursued. If both breasts are affected, it may not be advisable to operate upon either, fearing lest that one which remains may receive additional impetus to grow; or if the patient is married, the physiological effect of the removal of one or both of the lacteal organs should be most carefully considered, and only entertained when the question of life is involved. The medicines which give the most promise of success in hypertrophy of the breast, are: *Conium*, *Iodine*, and *Nitric acid*.

b. LOBULAR IMPERFECT GLANDULAR HYPERTROPHY.—This affection of the mammæ has been variously named. Sir Astley Cooper, who first called especial attention to the disease, named it the Chronic Mammary Tumor.* The term suggests a continuous inflammatory action, and is apt to convey an erroneous impression of the nature of the growth. M. Velpeau claims to have proposed the name Adenoid Tumor or Adenoma,† a pretension which seems to require further confirmation. Mr. Abernethy designated the disease Pancreatic Sarcoma,‡ but he applied Sarcoma to a

* Principles and Practice of Surgery, Sir Astley Cooper. Vol. I. London, 1836.

† On Diseases of the Breast. R. Velpeau.

‡ Surgical Works. John Abernethy. London, 1811. Vol. II, Surgical observations.

variety of tumors, and it seems very probable, as Mr. Paget has remarked, that the mammary tumor of Mr. Abernethy was a medullary cancerous disease. M. Lebert has named the disease, Imperfect Hypertrophy of the Mammary Gland,* but the designation of Mr. Birkett, Lobular Imperfect Hypertrophy, seems to be more accurately descriptive of the structure and character of the growth, than any which has yet been proposed.

Lobular imperfect hypertrophy, as the name implies, is an affection of one, rarely of more, of the lobes of the mammary gland. The tumor is circumscribed, and imitates in general structure the gland tissue in relation to which it is found. The imitation, however, is not perfect, for the adventitious growth has only in one instance† been known to perform the function of lactation.

First observed as a small hard tumor, seated in almost any division of the gland, though most commonly at its upper and inner part, lobular hypertrophy is rarely attended with more suffering, than an occasional uneasiness, and sometimes sensitiveness, at the menstrual period; the whole breast, however, may become the seat of the most exquisite pains, so that patients beg for its removal to relieve their suffering. The "irritable tumor" of the breast of Sir A. Cooper, is probably a mammary glandular tumor, which from a peculiarity of nervous relation or the idiosyncrasy of the patient, gives rise to severe pain, generally of a neuralgic character. The growth may be superficially or deeply situated; in neither case is it attached to the integument, but is freely movable upon the gland beneath. Its connection with the gland is not always demonstrable, but probably exists in most cases, and is of the nature of a pedicle; mobility is not thereby interfered with. Both breasts are sometimes affected. The tumors are usually multiple. Mr. Cooke has observed‡ that when single,

* *Physiologie Pathologique.* Paris, 1845.

† *Virchow Archiv.* 1859, XVIII.

‡ *On Cancer, its allies and counterfeits.* Thos. Weeden Cooke. London, Longman & Co., 1865.

they are more likely to degenerate than when multiple, but his remarks also include hypertrophic tumors of the lymphatic glands.

Adenoma vary in size; they rarely become larger than a hen's egg. One of the largest recorded, was removed by Mr. Stanley.* It measured twelve inches in length, and weighed seven pounds. The breast was pendulous and rested upon the woman's knees, when she sat. Mr. Liston removed a tumor of the same nature, which weighed twelve pounds.† After acquiring a certain size, lobular hypertrophy may remain inactive for years, frequently during life; rapid growth is very uncommon at any time. The skin covering the tumors, even though subjected to great tension, does not ulcerate, or show any signs of degeneration. If the tumor is very large, the integument is sometimes discolored by the increased size of its blood vessels, and the obstruction to the flow of blood, but further than this, there is no pathological alteration in the superficial tissues. The axillary glands are occasionally enlarged, but this enlargement does not seem to be a repetition of the mammary disease; it is rather a sympathetic inflammation or irritation, for when the primary growth is removed, the secondary tumors also disappear. The general health is rarely affected, though usually the catamenia are irregular, and more or less painful. These tumors have been known to disappear spontaneously. The conditions which seem to be favorable for their removal, are marriage, and erysipelas, the former, because generally followed by a true hypertrophy of the breast, the latter, through its action upon the deep lymphatics. Lobular hypertrophy is a disease of early life; it is rarely found after the thirtieth year. It occurs with equal frequency in married and unmarried, in prolific and sterile women.

No tumors are less liable to degenerate and prove incompatible with health, than lobular hypertrophy, but

* Mus. Coll. Surg. London, No. 208.

† Op. Cit. No. 216.

tumors assuredly glandular, so far as our means of observation extend, have become cancerous and destroyed life, the microscope confirming the diagnosis which objective and subjective symptoms had already established. Against the possible cancerous degeneration of this class of tumor, it has been urged* that a cancer and a glandular tumor have been found simultaneously in one breast, but this proves nothing. A person with a cancerous diathesis may have a glandular tumor as well as one who does not suffer from that diathesis, and although *a priori*, it is considered that such an abnormality would naturally be the seat of any latent diathesis, and generally would be such; conditions may exist elsewhere in the same breast, which are more favorable to the localization of the cancerous disease. The conditions essential for the change of a homologous into a heterogeneous growth, are not understood, and the exact nature of such changes remains unknown. A physiological type may be found for every pathological formation; may we not consider a lobular hypertrophy as near the beginning of those changes in type which in later stages are recognized as cancerous? It is beyond positive knowledge, to consider the slight deviation in the formative process which results in the overgrowth of a part, as but one expression of a diathesis which in its extreme development exhibits a cancerous growth; but we believe that future investigations and extended research will do much towards establishing such a relationship. After removing a lobular tumor, a cancerous growth has been known to occupy, in a short time, the seat of the original growth; this is interesting, for it shows that the diathesis, and therefore a cancer, may exist at the same time with a glandular tumor; or it favors the identity of the two affections, for the simple glandular tumor existing undisturbed, but ready for those metogenetic changes which precede its development, receives the necessary impetus in

* Surgical Pathology. James Paget.

the irritation and injury to the tissues consequent upon an operation for its removal.

The physical causes in contradistinction to the pathological causes of lobular hypertrophy, are intimately associated with the life of the generative organs. Irregularity of the menstrual flow is probably a cause of their appearance. Disease of the ovaries, or imperfect parthenogenesis—from which may arise some uterine or ovarian cysts, by exciting one or more of the lobes of the gland to activity,* produces a permanent enlargement at that place. Mr. Cooke states that he has been able in some instances to connect their appearance with sexual irritation, caused by too frequent coition, or masturbation. Mr. Cooke has also adduced evidence, which goes far towards proving that glandular tumors of the breast and phthisis are connected in no indirect manner.

Adenoma seems to be hereditary only in a general sense, that is to say, although parents who suffer from glandular tumor are not likely to transmit their disease, at least in the same form, to their offspring, some members of a family in which the cancerous diathesis is known to exist, are effected with tumors which resemble glandular growths in structure, but which run a rapid course, and present the forbidding appearance characteristic of malignant tumors.

The patient, when questioned, will usually attribute the appearance of lobular hypertrophy to some local injury; it is probable that the accident first directed the attention to a tumor which already existed. However, it may be as Mr. Lebert supposes; that effused blood, such as would exist at the site of an injury, gives rise to a fibrous deposit, which by metamorphosis may become a solid tumor. It is difficult to conceive of the change from a fibre cell to a gland cell; more probably there is no change in cell type, but the irritation which follows a blow is directly the

* See opinion of Rokitansky as to the origin of some cysts of glands.

cause of the subsequent enlargement or division of cells. M. Velpeau believed their most frequent origin to be traumatic. Of fifty-three cases which he observed, thirty-four were attributable to a blow.

The histological changes, which give rise to lobular hypertrophy, have been variously explained. Mr. Paget has advanced the theory, that originally the tumors are proliferous cysts which subsequently become solid by the growth of an intracystic substance. Scarcely conformable with this hypothesis, is the fact, that though very small when first observed, the tumors are hard, and apparently solid. More probably the tumor begins as an enlargement of one or more of the gland cells, or in an excessive division of the gland cells, by which a new mass of glandular tissue is formed. The elements composing this mass being endowed with vitality by their progenitors, but not subject to the same restraining formative laws, multiply and grow irregularly. The tumor does not seem to be wholly independent of the gland from which it originates, for there is constantly to be found a pedicle which connects the normal with the abnormal growth, but this pedicle is exclusive of the vascular supply of the tumor.

Microscopically examined, lobular hypertrophy is found to consist of lobes and acini. These may be placed very near to each other, but more frequently there are "partitions of filamentous looking tissue, fasciculi of which, curving and variously combined, appear to arch over, and to bound each acinus and lobule." In some cases the similarity between the tumor and the lobes upon which it is situated, to which similarity Mr. Lebert* first called attention, is quite remarkable, but more generally the growth resembles an undeveloped mammary gland, examples of which are found in the breasts of men. The tumor is surrounded by a fibro-cellular envelope continuous with the fascia of the gland. Sir B. Brodie observed in some

* *Physiologie Pathologique. Tome II.*

cases that the glandular structure was mingled with adipose tissue, as in the normal breast. Generally the tumors are hard, white, almost fibrous, but they may be quite soft and colored, according to the quantity of blood which remains in them, and the length of time which they have been exposed to the air, for oxygen has a tendency to turn the tissue to a dark smoky color. Commonly from the soft variety, there can be pressed a yellowish fluid, like serum. The soft tumors grow more rapidly than the hard growths, and in these the glandular tissue is less perfectly organized. Mr. Paget thinks that glandular tumors, but especially the hard variety, are liable to return after excision. This is not the testimony of other surgeons. New gland tissue is subject to the same diseases which attack the normal tissue. Cysts which contain various liquids or organized growths, are developed in their parenchyma, so that a simple glandular hypertrophy may present as many diseases as are to be found in the gland itself.

TREATMENT.—In no disease of the breast may more favorable results be expected from operative interference than in lobular imperfect hypertrophy. The generally superficial situation of the tumor, and the healthy condition of the surrounding tissues, render the removal of the growth very easy, and a speedy cure almost certain. Though it is exceptional for lobular hypertrophy to give rise to more than the local disease, it is best to remove the tumor in all cases, unless very strong counter-indications exist, for it may be the beginning of more serious troubles, the first step towards the development of a malignant growth, and therefore if excised when small, that particular localization of a diathesis is arrested, and just so much of the vitality or potential energy of the diathesis removed. Moreover, the presence of a mammary tumor is frequently a source of great mental annoyance, and the anxiety connected with its presence, complicates the prognosis. The handle of the scalpel will, in the majority of instances, be sufficient

to separate the tumor from the surrounding tissues. *Iodine*, *Nitric acid* and *Conium* exert a specific action upon this disease of the breast.

C. HYPERTROPHY OF THE ADIPOSE TISSUE, also named *Loupe* or *Lipoma* (Littere), *Adipose Sarcoma* (Abernethy), *Lipoma Mixtum*, when the investing capsule contains a large admixture of fibrous tissue, and *Cholestratoma*, when the fat resembles mutton suet (Müller), *Seatoma*, and lardaceous tumors, *Speckgeschwulst* (Gluge,* Rokitansky).

Sir B. Brodie describes four forms of adipose tumors.† I. The tumor is circumscribed. II. No definite boundary can be ascribed to the tumor.‡ III. The tumors are numerous, and of smaller size and firmer consistency than other fatty growths. IV. The tumor is small and rather firm, and its capsule forms a reflected membrane, “not less perfect than the peritoneum or pleura.” It is probable that any one of these varieties of lipoma may occur in the breast; we are not aware that the last two have been found in that organ.

A fatty tumor of the breast is first observed as a small, soft, elastic lump, situated superficially, immediately beneath the integument. Or the growth may be situated deeply, and when large, raises the gland from the chest. The diagnosis in such instances is somewhat embarrassed, since the tumor cannot be separated from the surrounding tissue. Or again, the tumor may dip down between the lobes of the gland and thus entirely surround the secreting apparatus, but this variety is scarcely distinguishable before an operation from that in which the tumor is circumscribed and situated beneath the gland. The softness, elasticity,

* Pathologische Anatomie.

† *Op. cit.*

‡ This variety is called by Chelius, *Lipoma dijusum*. The growth is not enclosed in a general sac, and the fat is somewhat firmer than in other portions of the body. (See South's Chelius, Vol. III.)

and sometimes almost fluctuation of lipoma, not infrequently lead to the impression that the growth is of a cystic nature, even when cysts do not exist—they are not infrequent in large fatty tumors—but the sensation communicated to the finger is peculiar, compared, by Chelius, with that which is experienced when pressing a bag filled with cotton, and the surface is in general lobulated, and uneven; moreover, as M. Velpeau has observed, the subcutaneous fatty tumor projects more perceptibly from the gland than a cyst of equal size, and the skin covering a fatty tumor is more natural than the skin which covers a true cyst.

Fatty tumors are not attended with much suffering, and the general health seems to be unaffected by their growth.* Neither, unless the tumor acquires a large size, does it show any disposition to degenerate, but they occasionally become enormous,† and then, apparently from no other cause than insufficient nourishment, inflammation attacks the centre of the mass—rarely the cutaneous structures—and abscesses form which discharge superficially.‡ Mr. Fergusson was called to see a woman in whose left breast a fatty tumor had been gradually increasing in size for twenty years, without giving rise to any suffering. About fourteen months before he saw the case, a small ulcer formed in the most dependent part of the breast, and continued open; a hard shell of bone was gradually deposited around its circumference.§

Fatty tumors do not differ from other pathological growths, in their susceptibility to cancerous degeneration. Sir B. Brodie removed an adipose tumor from a man's back,

* *British Medical Journal*, Feb. 22, 1868.

† Sir Astley Cooper removed one from the breast of an otherwise perfectly healthy woman, which weighed over 14 lbs. (See *Surgical Works*.)

‡ See interesting case in Sir B. Brodie's *Surgery*. Vol. III.

§ *The Lancet*, 1850. Vol. II.

in which he found, "dispersed throughout the mass, another kind of morbid growth, apparently belonging to the class of medullary or of fungoid disease."*

There is reasonable ground for the assertion, that when operated upon, they will not return, but Mr. Curling reports a case, in which four adipose tumors were successively removed from one spot.† The growth of lipoma is slow and uncertain, and there seems to be no limit to the size which they may acquire. They frequently change their position, so that a tumor which originated on the neck, may finally be found in the breast; this is of diagnostic value.

A fatty tumor when examined after removal, is found to consist of a mass of adipose tissue, perhaps more delicate, looser in texture, and of lighter color, than ordinary fat, surrounded by a fibrous capsule, which, by dipping down into the mass, divides it into lobes. When developed in the breast, it is not unusual for the tumor to contain glandular elements, and thus somewhat resemble the chronic mammary growth. This circumstance led Sir B. Brodie to "suspect that the fatty tumor and the chronic mammary tumor, stand in a certain relationship to each other, the structure being probably modified by the peculiar organization of the part in which the disease is situated." We would, however, question any other relation between fatty tumor and chronic mammary tumor than such as referred both to some error in nutrition. It is not improbable that a mammary tumor may favor certain constitutional conditions, anæmia, poverty of nutrition, or degenerate into an adipose mass, in the same manner in which a heart, liver or other organ may degenerate; but it is not probable that the inverse histological change obtains.

In large adipose tumors, there is usually developed one or more cysts, containing for the most part serum; the cyst

* *Op. cit.* Vol. III.

† Pathological Trans. XXIII.

walls have been known to become cartilaginous. Mr. Paget has distinguished small hard lumps in some fatty tumors, before their removal; these, he believes, "depend upon induration, contraction and a proportionate increase of the connective tissue of the part, changes probably due to the slow inflammation of the tumor."* Calcareous nodules occasionally are developed in adipose tumors;† they are a rare complication, and would seem to arise in the indurations which Mr. Paget has described. Fatty tumors probably originate in one of three pathological states; either in hypertrophy of normally developed adipose tissue, in deposit of fat cells from the blood, or in metamorphosis of the cells of the tissues in which the tumor is situated. The three conditions may be traced to errors in nutrition, and it is rather curious that the same results are attained by processes so diametrically opposed to each other; for the first process, hypertrophy, depends upon hypernutrition; the second, infiltration, is caused either by too large a quantity of fat being taken into the blood, or the fat is not being duly consumed; and the third, metamorphosis involution, is a transformation of albuminous into fatty substances, or a re-separation of an amalgam-like combination of fat and albuminates in the cell;‡ clinically, there is no distinction to be made between these histological changes. Possibly when the increase of fat is local and circumscribed—a tumor—the conclusion may be drawn, that the abnormality depends either upon hypertrophy or metamorphosis, but no absolute dividing line can be established.

Hypertrophy of adipose tissue presents no essential differences from an overgrowth of other structures. There

* Surgical Pathology.

† Trans. Pathol. Soc. IX.

‡ A Text Book of Pathological Histology. Dr. Edward Rindfleisch. Philadelphia, Lindsay & Blakiston, 1872.

may be an increased deposit of fat cells, or an excessive division of those already existing.

Fatty infiltration may occur in the cells of any tissue; whether owing to the introduction of an undue quantity of fat into the blood, as through rich food, or to the non consumption of the natural proportion of fat taken into the system, the pathological effect is the same; the cells are found to contain drops of fat in the highest degree of infiltration; the nucleus is pressed against the cell wall, therewith its functional activity is arrested, but upon the establishment of that nice adjustment between the demand and the supply, which constitutes health, they recover their physiological position. It is probable, therefore, that those adipose tumors which have been known to disappear spontaneously, were fatty infiltrations.

Fatty metamorphosis is the expression of a deeply seated dyscrasia, for there is a change of cellular type; moreover, the cells degenerate, and in proportion to the extent of the metamorphosis, the function of the tissues is diminished or wholly suspended. Fat probably has its origin in such processes as deprive albuminous bodies of their nitrogen. These are not always pathological processes. For the nutrition of the body, albumen must be derived from albuminous bodies,* and fat is one of the products of this metamorphosis. There is a physiological fatty metamorphosis of gland cells in the formation of colostrum and milk, and a perfectly normal fatty metamorphosis of the organic muscular fibres of the uterus begins about the sixth or seventh day after delivery, but the process may be considered pathological when the accumulation of fat serves no purpose in the economy. Fat, in the process of involution, does not attain the interior of the cell by intussusception; until the

* "All tissues must be built up from albumen; nitrogenized food must first be converted into albumen before it can be used in building up the tissues." *Animal Chemistry*, Justus Liebig. London, Taylor & Walton, 1843.

necessary but unknown influence, probably chemical, is exerted, it is in combination with other elements of the cell. When the fat exists in a free state, the cell is appreciably enlarged, for greater space is then required than when the elements were in a condition of interpenetration.

Thus far, of general fatty metamorphoses, the fatty degeneration of especial parts or organs is somewhat more difficult to explain. Probably the same laws are potent in both cases, but in the latter there is a peculiar susceptibility of the part affected, a weakness, or possibly, as in the mammary gland, an aggravation or perversion of a physiological process.

Fatty tumors of the breast do not seem to be connected with uterine derangement, though it is not improbable that nicer observations will reveal an abnormal condition of the generative organs, whereby the power of the mammary glands to resist disease is reduced, and a general disorder localized, or possibly through some recondite laws, the cells of the mammary gland are called upon to furnish more than their modicum of nitrogen.

TREATMENT.—When an adipose tumor is circumscribed and not situated deeply within the gland, it should be removed with the knife. The operation is simple and may be performed with the handle of the scalpel. But if the tumor is large, and developed between the pectoral muscles and the gland, and its removal would necessitate a considerable disturbance of the gland tissues, the surgeon should hesitate before operating, and first employ all other means to effect a cure. When the fatty mass fills the interspaces between the lobes of the gland, and the gland tissue is degenerated, the case is really serious, for if medicine fails to accomplish its removal the gland must be amputated. Constitutional treatment may avail much. Food which contains a large proportion of fat, or saccharine material, should be excluded from the diet, all malt liquors prohibited, and exercise in the open air be insisted upon.

The effect of child-bearing is probably salutary. The medicines which have been found beneficial are *Calcareæ carb.*, and *Phos.*; the various forms of *Potash* are also highly recommended, but each case must be studied, to ascertain, if possible, the cause of the disease; if this is corrected the tumors will disappear, or cease to grow.

D. HYPERTROPHY OF THE CONNECTIVE TISSUE OF THE BREAST.—Connective tissue tumors admit of being divided into two classes: tumors formed of loose, or areolar connective tissue, *Fibroma Areolare*, *Connective Tissue Tumor* (Vogel); *Fibro-Cellular Tumor* (Paget); and, tumors consisting of formed connective tissue, *Solid Fibroma*, *Fibrous Tumors*. Many subdivisions have been made, based upon some peculiarity in the history, arrangement, or complications of the growth, as recurrent fibroid, fibro-cystic tumors. Connective tissue tumors do not occur with equal frequency in all parts of the body. They usually in no way interfere with the general health, nor are they attended with any of the symptoms which are held to belong to malignant growths, though one variety, the recurrent fibroid tumor, of Mr. Paget, seems to be the expression of a general dyscrasia, in which the frequent recurrence of the tumor so drains the system for its support, as ultimately to prove incompatible with life; but we doubt whether these tumors are true examples of connective tissue growths. Microscopically, they differ from fibrous tissue, and their history shows either a peculiar disease of the connective tissue cells, or a morbid deposit within the tissue. The cells correspond to embryonic or rudimental cells, and this resemblance increases with each return of the growth; moreover, they frequently occur among the members of families in which the cancerous diathesis exists.

I am not aware that fibro-cellular tumors have been found in the breast. Fibrous tumors, in any location, have a tendency to assume a spherical or oval shape, but the form depends upon the resistance offered to their growth

by the surrounding tissues. In the breast they are somewhat lobed, for they have their seat in the fibrous tissue which connects the lobes of the gland, and show a disposition to assume an irregular shape. They are hard, firm, elastic to the touch, heavy and very tense. If situated in front of the gland, they generally become pendulous and are recognized as a simple elevation of the integuments. The hardness of fibrous tumors must not be confounded with the hardness which belongs to scirrhus. It is somewhat yielding, and though extremely hard, seems to be made so by the distention to which its non-resisting walls are subjected. Fibrous tumors belong to adult life, and are generally met with in unmarried women, between the ages of twenty and forty years. They are not of frequent occurrence considering the wide diffusion of cellular tissue; they are very rare in the breast.* Attributed generally to an injury, the fibrous tumor of the breast is first observed as a small, hard growth, freely movable on the surrounding gland tissue; its early stages are attended with little if any pain, and at no period is the suffering at all to be compared with that of scirrhus. The growth is generally slow, but sometimes an injury, or peculiar unknown condition of the system gives an impetus to the morbid influence, and the tumor increases rapidly to an enormous size. Fibroma are almost invariably single, and are more liable to be multiple in the same organ, than to appear simultaneously in several parts of the body. The purely fibrous tumor probably never gives rise to a secondary deposit in the lymphatic vessels or neighboring glands. When the axillary glands at the same time suffer fibrous enlargement, the condition is not dependent upon the breast disease, but upon the constitutional disorder. This dyscrasia, as we have seen, is usually exhausted at one point. The general health is not affected, the tissues surrounding the tumor remain healthy, and never adhere to the tumor unless ulcer-

* Bulletin de l'Acad. Roy. de Méd. de Paris. Tom. IX, 1843-44.

ation attacks the morbid mass. Then bleeding fungous granulations spring from the ulcerated surface, and present some resemblance to cancerous degeneration, but immunity from constitutional symptoms, will generally determine the nature of the disease.

Microscopically examined, fibroma consist of "distinct connective tissue fibres, which are arranged in every possible direction, and on this account are with difficulty isolated, rarely of indistinct fibrous or wavy connective tissue, besides of connective tissue corpuscles in varying abundance, of comparatively numberless vessels, and commonly, also, of elastic fibres."* They bear a general resemblance to fibro-cartilage, and their section is accompanied with a creaking noise. They are white, grayish, or yellowish in color, and their vascularity is in an inverse proportion to their density. As in the normal connective tissue, the vessels are generally very small. The tumors are invested with a distinct capsule, of condensed connective tissue to which the fibrous mass adheres, but which is not adherent to the gland.†

Fibroid tumors are formed by a proliferation of the connective tissue cells. As these cells, or *fibro-blasts*, increase in number either by division or gemmation, the intercellular basis substance is also increased, probably by a peculiar action of the bioplasm of the fibro-blasts, and in this way is built up a tumor of varying proportions and consistency, according to the predominance of cell life. For some reasons not at present understood, connective tissue is obnoxious to degeneration, and especially so when relieved from the controlling influence of growth, as in hypertrophy. M. Virchow says: "connective tissue (fibrous) tumors, become, under certain circumstances, richer in cells, and enlarge, whilst the interstitial connective tissue

* A manual of General Pathology, Ernst Wagner.

† Elements of Surgery, Robert Lister. London, Longmans & Co., 1840.

becoming more succulent, may in many cases disappear so completely, that at last scarcely anything but cellular elements remain. This is the kind of tumor, which, according to my opinion, ought to be designated by the old name, *Sarcoma*." *

There are probably two methods of degeneration; the cells may become diseased, or the basis substance replaced with pathological products. Both of these conditions not infrequently exist at the same time. The recurrent fibroid tumors, which under the microscope show "peculiar structure," and the fibroid cancer, fibro-plastic tumor of Mr. Lebert, are instances of a connective tissue tumor becoming infiltrated with heterogeneous life, or the fibro-blasts of the tumor degenerating.

The most frequent diseases of fibroid tumors, consist in the formation of cysts, or in the deposit of calcareous and other salts in the substance of the growth. Cysts have their origin either in a local softening, and effusion, or in a replacing of the basis substance with a fluid which becomes circumscribed, by the formation of a cyst wall. It is probable that in fibro-cystic tumors of the breast, the natural tubuli of the gland, by dilating, form cavities into which fluids are effused or secreted; Mr. Curling has shown this to be true of cystic diseases of the testicle.† The cysts are generally multiple, very small, and correspond to the interspaces between the intersecting bands or stroma of the tumor. The tumor is of slow growth, mobile, and forms no adhesions to the cutis unless ulcerated. The surrounding tissues remain healthy.

Fibro-calcareous tumors are heterogeneous growths in many instances, and perhaps should be classed in that division of pathology, but they may with propriety be mentioned in this place; first, because they are an infiltration into a perfectly homogeneous growth, and second, because the

* Cellular Pathology. *Op. cit.*

† Med.-Chir. Trans. XXXVI. 1853.

tumor never entirely loses its primitive anatomical characteristics. The calcification of connective tissue is of rare occurrence. Newly-formed connective tissue is more obnoxious to this histological change, than that of less recent growth; therefore it is probable that fibroma possess a certain degree of immunity from calcareous degeneration, as the time of their growth increases.*

The degeneration occurs in two forms. The whole tumor becomes infiltrated, so as to resemble a fine network of calcareous bands when the organic substance is removed; or the lime salts are deposited around the tumor so as to form a shell for it. The former condition is most frequently encountered. In either case the tumor is hard, unyielding, heavy, and possibly rough, from the irregular surface of the lime deposits. True fibro-calcareous tumors belong to the class of infiltrated growths. They show no metamorphosis of cellular elements, nor change in type of the fibro-blasts. The lime salts are deposited either in solution, which afterwards crystallizes, or as an insoluble compound. The blood is the immediate agent in this process, though the primary cause of a change in the constituents of the blood, resides in a general disease, or an abnormal condition of some organ of the body.

Among the varieties of fibrous tumors may be ranked the keloid growth. *Keloid* or *kelöide* tumors were first recognized as distinct growths by Alibert,† who, conceiving that they slightly resembled cancer, named them *cancroid*, an appellation, the correctness of which has been disapproved

* This does not agree with the opinion of Mr. Jones. He believes that the calcareous "degeneration" bears no relation to the age of the growth (Pathological Anatomy, Jones and Sieveking); but because of the greater susceptibility of newly-formed connective tissue for calcareous infiltration (Manual of General Pathology, Ernst Wagner) Mr. Jones may be erroneous in making so positive an assertion.

† Description des Maladies de la Peru. 1806.

by more recent investigations. In 1854, Thos. Addison read before the Royal Medical and Chirurgical Society of London, a paper "On the keloid of Alibert and on true keloid."* Dr. Addison's description of the disease is clear and concise, and with Dieberg's pamphlet (*De Tumoribus Celoidibus*, Dorpat, 1852), may be considered our best authority on this subject; but it is doubtful whether there are two distinct diseases to which may be applied the name keloid, as Dr. Addison has endeavored to demonstrate. Varieties of the same morbid condition they undoubtedly are, but the difference between them consists more in external form than in minute anatomy, and does not seem sufficient to justify their separation into two diseases.

Keloid tumors have been classed among cancers by M. Velpeau; among cutaneous outgrowths by Mr. Paget; and with fibro-plastic growths by Mr. Lebert; they, however, partake largely of the fibrous elements, and resemble connective tissue tumors in their history and course of development. Keloid tumors may be called fibrous tumors of the skin.

Keloid is a new formation of connective tissue which originates in a proliferation of cells around the vessels of the corium.† It appears most frequently in cicatricial tissue, but has been known to follow an injury. When first observed it is as a small red lump, hard, not sensitive. This nodule gradually increases in size, and throws out claw-like processes which spread in all directions, and finally envelop the whole chest, crossing from one breast to the other. The appearance thus presented, is that of a large scar, red or pink, raised more or less above the surrounding integument, which is drawn in folds towards the centre of this growth. There is itching, and sometimes are felt dragging pains in the growth, though the suffering

* Med.-Chir. Trans. XXXVII.

† Hand book of skin diseases, Dr. Isidor Neumann. Trans. by Lucius D. Bulkly, A.M., M.D. New York, D. Appleton & Co., 1872.

is never very severe. The tumor may remain inactive for years, and cause no inconvenience, but irritation is liable to give an impetus to its growth, and to be followed by pain and possibly ulceration.

The other variety of keloid tumor, the "True Keloid" of Mr. Addison, generally arises from several centres, which coalesce and form a dense, hard, fibrous plate on the chest. It is attended in the early stages with less inflammation and consequently less integumental discoloration than is observed in the first variety. The growth by extending, binds the affected part as with a closely fitting plate of steel, preventing the contraction of the thoracic muscles, and the functional activity of the breast.* This variety of keloid is more formidable than that which is characterized by claw-like processes, because of its interference with functional activity, not because of any intrinsic property, which is incompatible with health.

Microscopically, keloid tumors are seen to be composed of fibrous tissues, condensed and hardened cicatricial tissue, with a liberal blood supply. Dr. Dieberg found in a case which he examined, many elongated cells and spindle-shaped bodies. The latter at a somewhat later period, seem to have lost their nuclei and assumed a fibrous appearance.†

There seems to be no limit to the number of times which a keloid tumor may return after its removal, but the disease always attacks the region first affected, and does not cause secondary disease of the lymphatics. The general health remains good and the growth rarely suppurates. The disease generally attacks women between the ages of 18 and 35.

* M. Velpeau (*Diseases of the Breast*) reports a case in which the tumor involved both breasts, and a large portion of the chest. He operated for its removal three times.

† There is a remarkable resemblance between this description and that which Mr. Paget (*Surgical Pathology*) has given of a recurrent fibroid tumor.

The prognosis of fibroid tumors is not unfavorable, the complications according to their nature change the prospect of a cure, but these are generally only to be distinguished after the removal of the growth.

TREATMENT.—Fibroma, fibro-cystic and fibro-calcareous tumors, should be removed with the knife, but it is useless to operate upon recurrent fibroid or the fibro-cancerous tumors, for the secondary growth is always more malignant and rapid in its course than the primary infiltration; each removal is followed by the appearance of a tumor more lowly organized and less able to resist the encroachment of any disease which may be latent in the system. But it is not always possible before operating to determine the exact nature of the tumor, and therefore great caution should be exercised in deciding for or against an operation. As a general rule, it may be said that all tumors which have a tendency to recur after removal, grow more rapidly than those which are radically cured by an operation.

Statistics show the little benefit to be derived from removing keloid growths. The tumors invariably return and assume a more forbidding aspect than at first. Pressure has been recommended, but Mr. Naylor believes that such a course of treatment rather increases than mitigates the evil which already exists.* Caustics have also been proposed and proved beneficial in some instances. Any treatment which is really successful must be constitutional, or local, to render the scar unfavorable for the return of the disease. An early healing of the wound becomes therefore of the first importance. In prescribing, any irregularity of menstruation should be corrected.

The medicines which seem to act especially upon fibrous tumors, are *Phos.* and *Phos. Acid*; other remedies are *Ac. acet.*, *Ac. nit.*, *Arsen.*, *Bry.*, *Calc.*, *Lach.*, *Merc.*, *Sil.*, *Sulph.*

* A Practical and Theoretical Treatise on the Diseases of the Skin. George Naylor, London, 1866.

§ II. The production of a structure where it does not belong. HETEROTOPIA.

1. *Carcinoma*.—The term carcinoma is not satisfactory, for it describes neither the all-pervading, nor the local disease to which it is applied; but for centuries the name has been associated with a peculiar state of health, and among civilized peoples is synonymous, in pathology, with malignant; therefore it is retained, since a better one has not been proposed to take its place.

Carcinoma is a chronic infectious disease,* with well marked primary, secondary, and tertiary stages. The primary stage of carcinoma is characterized by a local tissue metamorphosis, the cancerous tumor. This contains no structures which may not be found in other tumors, but their condition and arrangement are peculiar. The cells and stroma, connective tissue, in varying proportions, form a disorderly mass, having no prototype in normal structures. The cells are irregular in shape, generally possessed of many nuclei, and seem to be packed between the meshes of the connective tissue of the organ in which the disease is localized; or aggregated, they form a mass in which very little connective tissue exists. There is no uniform cancer cell type, but probably any cell in the body may become cancerous, and still possess enough of its characteristics to be recognized, at least until a very late period, as belonging to the class of histoid elements from which it originated. This points to the hypothesis, that carcinoma is not, either as a general or a local disease, dependent upon peculiar cell changes, but that its origin is in something not bounded by matter, but something by which matter is disposed. The forces which regulate the construction of each cell in the body, are probably not

* It has not yet been proven that carcinoma is capable of being communicated from one person to another, or of being conveyed through the atmosphere, clothing, etc., but different parts of the same body may be, and as a rule are, infected from the primary disease.

remote from those forces which determine the disease of cells; the indefinable something which we call life, presides over all the living changes which take place in the body, the normal and the abnormal alike.

Though it is probable that each tissue may be invaded by the cancerous influence, a comparative immunity is shown by certain cells from the morbid principle. Epithelial cells are more frequently affected than others;* next in frequency, may be placed connective tissue cells, and next osseous cells; with the cell which is diseased, the type of the cancerous tumor varies. In a certain sense cancerous tumors are homologous growths, for they usually originate in the naturally developed tissue of the part in which they are developed; but as the tumor runs its course, the cells differ so essentially from their progenitors, that the growth may with propriety be considered heterogeneous. Carcinomatous tumors are composed of peculiarly metamorphosed cells, and a stroma. The cancer knot is rarely invested with a capsule; the absence of a well marked boundary between the healthy and the diseased structures, favors the multiplication of local processes. The cells may be recognized by their increased number and size, the multiple and considerable size of the nuclei and their resemblance to embryonic cells. The stroma is the solid part of the tumor, in or around which the diseased cells are deposited or grouped. It consists of connective tissue more or less dense. The consistency and quantity of the stroma bear a direct ratio to the firmness of the growth. When the stroma predominates and partakes of the nature of fibrous tissue—formed connective tissue—the tumor is

* Dr. Creighton has made careful experiments upon cancerous diseases of the liver, and he has observed that the departure from the normal cell type, is not in proliferation of the epithelial cells or nuclei, but consists of an endogenous cell formation, the beginning of which is vacuolation of the bioplasm of the cell. The secondary cells resemble the primary cells, and may be compared to parent and offspring.

hard—*scirrhus*, but if the cellular elements exceed in quantity the stroma, or the stroma is similar to mucous tissue, the tumor is soft and yielding—*encephaloid*.

Both of the elements of cancer are subject to disease. The cells may become infiltrated with pigment, or the cancer may occur in pigmented tissues—*melanosis*,* or the stroma may ossify—*osteoid cancer*. The tumor is well supplied with blood, but the connective tissue only is vascularized.† Probably no new lymphatics are formed, but those which naturally exist are enlarged. The whole tumor may become atrophied through fatty degeneration, and shrink in size. The local cancerous disease occurs most frequently in glandular organs, or in those organs which are subject to alternations of activity and repose. They generally arise in the secreting cells, because these are subject to many changes, within the bounds of health.‡

Secondary cancer is usually an *encephaloid* growth,§ and is situated in the lymphatic glands which communicate with the part first invaded. Carcinomatous tumors in other organs are probably developed independently of each other, and therefore cannot strictly be considered secondary growths.

The origin of secondary cancer has been variously explained; two hypotheses claim attention:

(1.) The tumor is held to be a direct continuation of the primary disease, propagated by means of the lymphatics. That is to say, the peculiar morbid cellular elements of the primary stage, are carried to a lymphatic gland, and there,

* Illustrations of Clinical Surgery. Jonathan Hutchinson. London, J. & A. Churchill, 1876. Fascicles, II.

† General Surgical Pathology and Therapeutics. Dr. Theodore Billroth. New York, D. Appleton & Co., 1875.

‡ See *Ætiology*, page 26.

§ The Nature and Treatment of Cancer. Walter Hugh Walshe. London, 1846; also Clinical Illustrations of various forms of Cancer. Oliver Pemberton. Longmans & Co., 1867.

by a kind of "spermatic influence" (M. Simon) upon the healthy cells of that gland, or by simple proliferation, give rise to an independent growth which invades the gland, and forms a separate disease. Cancer cells migrate from their place of origin through the lymphatics and blood vessels, for they possess amœboid movements, similar to the white blood corpuscles (Mr. Moxon). These little bodies also penetrate the walls of the vessels, and are deposited in the surrounding tissue, where they are capable of establishing, or assisting in the establishment of, a new cancerous tumor. Some facts, as the different nature of the primary and secondary growths, rather militate against such a mode of extension; but cancer cells seem to possess a "spermatic influence" upon the cellular elements which surround the cancerous tumor, and it is probable that the same phenomenon is repeated wherever the cells are deposited, provided that is an "apt locality" for the nourishment of cancer cells. Probably, carcinomatous tumors owe their origin, in the majority of instances, to the same agency which gave rise to the primary growth, and the usual variation in type depends upon the differences of the tissues affected. This hypothesis is confirmed by the considerable time which intervenes between the primary and secondary growths. Morbid material, from the beginning of the first tumor, passes through glands which only at a later day become diseased.

.(2.) The secondary tumor is considered an evidence of the evolution of the cancerous disease. This hypothesis may or may not include a belief in the original all-pervading character of carcinoma, for the secondary stage may be a further development of the primary stage, as well as that both stages are phases in the evolution of a dyscrasia. It is only necessary to refer to other diseases, infectious or otherwise, as syphilis, to show that all run their course, with definite local and constitutional symptoms, and that all these phases depend upon a common derangement of the life of the organism. It seems not improbable that the secondary

cancer is a step in the development of the cancerous disease. As a rule, this stage is more malignant than the primary stage, it runs its course more rapidly, and histologically deviates more markedly from healthy tissues.

The tertiary stage of cancer is a general disease. It affects every part of the system, and is marked by extreme prostration, low fever, and finally death. The views which are held concerning the nature of the tertiary stage, are influenced, indeed formed, by the attitude which is assumed towards the two opposing theories of the origin of cancer, *local* and *all-pervading*. According to one theory, the local affection is the beginning of the disease. From this all subsequent symptoms emanate. The constitution is not invaded, or affected, save through the local disease, and the malignancy is determined by the extent to which the active principle of the original tumor is disseminated through the system. Those persons who would so explain the origin of cancer—the *localists*—seem to have forgotten, at least they have neglected, to mention the cause of the primary disease. It is a pathological law, that diseases which are specific in their nature, are not known to arise spontaneously, but constantly depend upon a peculiar poison, the production of which is owing to certain unchanging conditions. It is believed that this specific poison does not have its origin in the body of the person affected, but is conveyed through the atmosphere, the food, or by the contact of one body with another, or from parent to offspring. Infectious diseases may be divided into two classes, relative to their origin. One class embraces poisons which are capable of renewal by certain telluric conditions—a coition of the proper elements—which being received in the body, there ferment. The other class includes those poisons which probably never became extinct, but are *sui generis* poisons, independent in their present form, of any combination of circumstances, and which are spread by direct propagation from the parent stock. The methods of the conveyance of poisons of

the second class, present many variations. The typhoidal poison is introduced into the system with the water drank; syphilitic poison enters the system through the circulation. Cancer is incontrovertably a specific disease, and the question at issue is, does the poison which gives rise to the cancerous tumor originate in the body of the person in whom the tumor occurs, and at the spot at which it is developed, or is the poison introduced into the system from without, or born in the system as a part of it, and subsequently localized at a particularly susceptible spot? If cancer is an infectious disease, it differs from all other diseases known to belong to the class, for we are in possession of no data to support the hypothesis that it is conveyed either through the atmosphere, or propagated by direct contact. But infectious diseases should not be limited to those which can be acquired by the adult organism. If the man can become affected, the child and fœtus can also be affected, and if these are susceptible to disease, surely the ovum possesses no immunity. If the ovum is infected with a disease, the source of infection must come through the spermatic fluid, but as Mr. Wallich has remarked,* it is not always enough to carry one's observation back to the beginning of the impregnated ovum; at that time, it may have become infected through the influence of the mother. If cancer is an infectious disease, it must be ranked with those diseases which are propagated by means of a poisoning of the ovum, diseases born with the individual, and constituting a part of his economy—syphilis, etc. By this means a disease becomes constitutional, that is to say, the vitality of the individual is not perfectly healthy; the force by which each part is made to perform its functions, is either possessed of something, or from it something is withdrawn which perfect health requires to be present. This vital derangement, constitutional disease, diathesis, may affect in a

* *The Lancet*, April 7th, 1874.

peculiar manner every tissue of the body, or only certain tissues may be acted upon; probably the poisonous influence is more especially contained in one tissue, or one fluid, and by means of these, becomes localized, when a fitting location occurs. A disease which is acquired through infection of the ovum, is constitutional, and such a constitutional disease is hereditary; therefore, if cancer can be shown to be hereditary, we cannot escape the conclusion that the disease is, from the beginning, constitutional.

The hereditary nature of cancer is not susceptible of proof at present, and for this reason: enough is not known of the evolution of disease, the changes of type which depend upon recondite combinations of circumstances, to trace a particular form of a diathesis to its source, or to establish a positive relation between it and other diseases which are now considered to stand alone; and again, it is very unusual for one to be informed as to the health of one's great-great-grandparents. The tendency of modern medical science, is to combine rather than to separate diseases, and many observed phenomena suggest a common origin for cancer, syphilis and tubercle. A cancerous parent has a child who dies of consumption, and a consumptive parent has an offspring who suffers from cancer; the grandchild of a syphilitic person is afflicted with one of these maladies.

Notwithstanding the difficulty of obtaining statistics concerning cancer, and their untrustworthy nature, Mr. Paget is able to assert that cancer is inherited in the ratio of one in three. With this conclusion, many, especially English surgeons, are not in accord, but Mr. Paget's observations were carefully made, and cannot be thrown aside. Positive evidence will always weigh against that which is negative, and those pathologists who assume the latter position, must first demonstrate the fallacy of the percentage which Mr. Paget claims, and the impossibility of proving its correctness, before their own observations

can be accepted with the same degree of authority to which his are entitled. Belief in the local origin of carcinoma, among the chief upholders of which is Mr. Hutchinson, is mainly based upon the non-appearance of constitutional symptoms, until the cancerous tumor has advanced to a certain stage of development; indeed, persons who in later life become the subjects of cancer, are before the outbreak of this disease, remarkably healthy and robust in appearance. Before subscribing to this position, and all which it involves, for it cannot be denied that if proven, the constitutional origin of cancer must be rejected, it is well to consider the usual course of infectious diseases, and the age at which cancer usually appears. All diseases which arise from the infection of the organism by some poison conveyed from without, whether the disease is at first local or general, are observed to have a varying period of incubation, during which the poison develops, ferments possibly, and so affects a part, or the whole of the organism, as ultimately to develop into a characteristic disease. If three or four weeks embrace the incubating period of syphilis,* the first manifestation of which is a local sore; two or three weeks, that of typhoid fever, and months or years that of hydrophobia, it is not inconsistent to allow more than a quarter of a century as the period of incubation for cancer, during which time there are no external evidences of the existence of the disease. The outbreak of a disease does not depend alone upon the development of the poison, but upon the state of the system in which the poison is growing. Carcinoma is a disease of declining years, appearing after the pause in life, and when the vital forces are weakened in their ability to resist the encroachments of disease, by the slow, natural decay of the system. It is not improbable that the incubating period of cancer corresponds to the vigor of life, and this varies in different individuals. May we not therefore

* The Pathology and Treatment of Venereal Diseases. Freeman I. Bumstead. Philadelphia, Henry C. Lea, 1874.

assume, that cancer is a chronic infectious disease, contracted in embryonic life, that its period of incubation varies with the vigor of the person affected, that its first manifestation is in the form of the well known cancerous tumor, and that its secondary and tertiary symptoms mark corresponding stages in the development of the dyscrasia?

It is almost an invariable rule for cancers to grow again after their removal, and the second growth is generally more rapid in its course, and of a more malignant type than the first growth. The return of the local disease may depend either upon an imperfect removal of the primary tumor, or a new outbreak of the dyscrasia. The increased malignancy of the second tumor rather favors the latter hypothesis; for as carcinoma develops, the tumors formed resemble less and less normal tissue.* But cases of undoubted cancer are mentioned, in which a cure was accomplished by an operation, and others in which many years of apparently perfect health intervened between the removal of the first, and the appearance of the second, growth. In persons who have the cancerous diathesis lightly, in the sense that an attack of any other disease may be severe or light, the development of one tumor exhausts the poison resident in the system, and so frees it from both secondary and tertiary symptoms. And in other cases, one tumor may partially exhaust the poison, leaving enough to multiply and grow, and when a fitting opportunity occurs, develop into a secondary growth, for the recurrent tumors generally resemble closely the tumors which mark the secondary stage of carcinoma. The cancerous diathesis may remain dormant for many years. It is probably by virtue of this property, that the disease passes over one or two generations, and reappears in the second or third removed from the diseased progenitor.

It is probable that the blood, being more universally distributed to the body than any other fluid or solid, is

* "Antecedent Conditions of Cancer," Mr. Moore. *British Medical Journal*, August 20th, 1865.

more disordered than other elements, and in this sense cancer may be considered a blood disease, but as we have had occasion to observe in the "ætiology of disease," a constitution is the sum of the organism, and not one element or part; this constitution is not a material influence.

Concerning the causes of cancer, very little is known. It is supposed by Mr. Haviland* to arise from certain climatic conditions, and he believes that he has discovered "cancer fields" in England, where, with peculiarities of the soil, cancerous cases abound. He has observed that where primitive rock formations exist, the disease is comparatively rare, but as one descends to the bed of the rivers, and reaches the tertiary formations, and especially low-lying alluvial lands, which are subject to frequent inundations, cancer is met with much more frequently. But it seems more probable that these endemics of cancer are caused by frequent intermarriage, which is quite common in certain provinces of England. Possibly the disease, in the remote past, has been communicated to man from some of the lower animals,† but it is more probable that in both man and the lower animals, cancer originated in the evolution of some other disease.

The most generally accepted hypothesis among the constitutionalists is, that cancer is one form of a diathesis, of which tubercle, syphilis, and possibly gout, are other forms.‡ The diseases appear to be interchangeable, and

* *The Lancet*, April 7th, 1874.

† Cancer is not uncommon among some of our domestic animals. I am not aware that the disease has been observed in wild animals. It affects the lips and parotid glands of horses, the œsophagus of horses and oxen, the testicles in dogs, horses, hogs and asses, and the penis in dogs and horses, more frequently than the same parts in man. (*Recherches de Pathologie Comparée*, par C. F. Hensenger, Cahier deuxième, Cassel, 1844.) The disease follows the same laws of inheritance which are observed in man. Dr. Crisp mentions a bitch that had carcinoma of the breast, and her offspring also suffered from carcinoma.

‡ Clinical Lectures and Essays. Sir James Paget, *loc. cit.*

the alterations in form may depend upon the evolution of the disease, or upon the idiosyncrasy of the person infected.

Modern investigations point towards epithelial, as the tissue in which cancerous degeneration is most likely to occur primarily. Connective and endothelial tissues are not infrequently infected, but the metamorphosis is secondary.

The two principal forms of cancer, hard and soft, are developed in the mammary gland.

(1.) *Scirrhus, Hard Cancer.*—Scirrhus cancer of the mammary gland, has its origin in changes in the secreting cells which surround the terminal vesicles of the gland. The process is one of endogenous cell formation, the first step towards which is vacuolation. During lactation, this process is physiological, resulting in the formation of the fatty constituents of milk; but in the growth of a cancerous tumor, there is nothing which can be recognized as fatty involution or infiltration; a different stimulus imparts to the epithelial cells a peculiar property of multiplication, and infuses them with a morbid life principle, by virtue of which they are enabled to contaminate other cells with which they are brought in contact, and infect other organs. What this principle is, we cannot tell, but that the cell itself does not destroy life, is very probable; the development of the carcinomatous poison, of which the tumor is only an external manifestation, is that which is incompatible with a state of health, or even with life. By the proliferation of the epithelial cells, the tubuli and acini of the gland are filled up, and projecting nodules formed into the connective tissue which unites the several parts of the gland. The increase in the size of glandular cancer is not in every case entirely dependent upon the multiplication of the primarily infected histological elements, but is in part accomplished by an "epithelial infection," communicated from the epithelial cells to the

neighboring connective tissue and lymphatic endothelial cells.*

Scirrhus cancer is usually an infiltrated growth, having no distinct capsule. It projects into the connective tissue, and follows the course of the lymphatic glands, so that upon section it presents the appearance of tubuli filled with great masses of small epithelial cells. Upon the small size of cancer cells the hardness of the tumor is somewhat dependent, but the chief causes of hardness are the proportion of the stroma of the growth, and the disposition which the bioplasm of epithelial cells shows to early change into formed material. This, as in the nails, or the outer layer of the skin, imparts a considerable degree of resistance to the neoplasm. The firmness may also be owing to the manner in which the cancer cells are packed in the interspaces of the stroma. Sometimes the firmness is so excessive as to interfere with cutting the mass, *duritius eburnea scirrhus*. These carcinomas are glisteningly white, and are composed for the most part of dense, fibrous tissue, with occasional nests of cancer cells. Carcinomatous tumors are sometimes not uniformly hard in all their parts. In such instances, the soft portion is peripheral, because last formed, and frequently not really cancerous; the hard portion is central, because first formed, and between these two there exists almost every gradation of firmness.

Scirrhous of the breast is first observed as a small hard tumor, round or oval, adherent to the gland tissue, or rather forming a part of the gland. The surrounding structures remain healthy throughout the course of the disease. The tumor is well defined, and when manipulated, can be separated from the adjacent tissues, though the absence of a true capsule prevents a perfect dissection of the tumor. In this condition the nodule may remain for months, but usually there is a slowly perceptible increase in size. At first the tumors are so small and free from pain as to attract no

* A Text Book of Pathological Histology. Dr. Edward Rindfleisch. Philadelphia, Lindsay & Blakiston, 1872.

attention; this will explain the frequency with which carcinoma of the mammæ is attributed to a blow. A traumatic agent is inadequate to cause a cancer, though an injury may give rise to an "apt locality," by interfering with the health of the secreting cells at the place where the injury is received. When the cancerous tumor has existed a variable length of time, secondary tumors develop in the neighboring lymphatic glands, those which are in the course of the passage of lymph from the breast to the thoracic duct, the axillary glands. The secondary tumors usually develop about midway between the first evidence of the primary disease, and death. Sometimes the lymphatic tumor is much larger than the mammary growth; occasionally they are developed simultaneously, though this is very rare. As the disease advances, the lymphatic vessels and accompanying small glands enlarge, and appear as hard cords leading from the primary to the secondary tumors. The changes probably always begin in the epithelial cells situated at the periphery of the lymph gland,* and the process by which a tumor is developed differs in no essential from that which attended the construction of the primary tumor, save that a more direct infection from local disease may obtain. The pain which accompanies scirrhus cancer of the breast, is sometimes most exquisite, continuing without intermission for days and nights, until the sufferer is exhausted from waste of nervous energy; at other times there is no pain.

Scirrhus tumors show marks of degeneration before they have attained a large size. These changes are either

* It seems rather strange that the lymphatic vessels are not earlier and more generally affected. If the source of infection is in the mammary tumor, it must first pass through these canals before it reaches the glands. Probably the reason of the comparative immunity of lymphatic vessels from cancerous infection, is to be sought for in some peculiar resisting power possessed by the endothelium with which they are lined. Endothelium is rarely attacked by carcinoma, and we may believe that when this does occur, it marks an advanced stage of the disease.

central or peripheral, and result in atrophy, the formation of pus, the deposit of calcareous matter, or in ulceration. Simple atrophy is of very frequent occurrence, and is mostly associated with fatty metamorphosis of the cancer cells. The atrophied tumor becomes smaller and harder, the central nodule draws the surrounding tissues of the breast inwards, the nipple is retracted and where formerly there was a prominence there is a depression. This depends upon a cicatricial contraction of the larger milk ducts and consequent drawing inwards of the mammilla. The diseased breast becomes much smaller than the healthy organ, and sometimes, if secondary infection has not occurred, the disease makes no further progress. The blood vessels become small and are in places entirely obliterated. The surrounding lymph glands suffer in the same way. The cause of atrophy, is obliteration by cancerous growth, of the blood vessels through which the tumor is supplied with nourishment. The bioplasm gradually dies, and the cells become hard and dry. Fatty metamorphosis of cancer cells is a true instance of involution, and differs not from fatty degeneration in other tissues. It is probable that the fat with which the cell is filled is not obtained outside of the cell, but arises from reseparation of the albuminates and fat, which are the principal constituents of the cell contents. Nucleolus and nucleoli are also involved in the degeneration; the bioplasm is the starting point of the destruction. The cell becomes larger and hence the size of the tumor is augmented, but it loses its hardness and becomes soft and elastic; a section shows an abundance of oily matter which oozes from the cut surface.

The formation of pus in the centre of scirrhus of the breast, is rare. The process is one of slow inflammation, which causes disintegration of cancer cells, rarely of connective tissue, and results in the development of an abscess. This softening must not be confounded with the softness of medullary cancers. When the abscess

is of sufficient size, all the symptoms which are characteristic of a collection of purulent matter, circumscribed fluctuation, etc., are present. The opening through which the pus is discharged, shows no disposition to heal, but rapidly increases, and from the surface of the abscess cavity, fungous granulations spring, which bleed easily, and emit a sanious, offensive discharge, which excoriates the surrounding parts.

The ulceration of scirrhus is closely associated with the internal formation of pus. There are two varieties of ulceration, one proceeding from within outwards; of this we have already spoken; the other has its origin in an abrasion of the skin which covers the tumor. The ulcers are not deep, but show a tendency to spread. The margins adhere firmly to the tumor beneath, are not inflamed, and are for the most part irregular in shape, raised above the base of the ulcer, and everted. When there are several ulcers, they rapidly coalesce. The bottom of the ulcer presents a gray or reddish-green color, is uneven, soft, and covered with luxuriant granulations, which give it the appearance of villous cancer. The patient usually dies during the ulcerative process.

Calcification of cancer cells is a rare disease. The stroma is more frequently metamorphosed than other parts of the tumor.* The calcification affects isolated nodules which become of stony hardness; it is usually associated with fatty degeneration and simple atrophy.

Scirrhus cancer exists more frequently in the female breast, than in any other organ. It occurs with most frequency between the ages of forty five and fifty; it is very rare before the twenty-fifth year, and after the seventieth year.† Marriage seems to favor the development of

* Förster describes two cases of *cancroid*. In one, the cell's stroma and vessels were calcified; in the other, the vessels were still demonstrable. (*Würzb. Verh.*)

† The earliest age at which cancer of the breast has been observed, is the eighth year. See Diseases of the Breast. John Birkett, *loc. cit.*

scirrhus cancer. The proportions in 260 cases were :

Single, 23'0 per cent.

Married, 72'4 " "

Widow, 4'6 " " *

The reason for this may exist in the oft-repeated periods of functional activity of the breasts of married women, and also in their sympathy with the generative organs.† Of fifty-five married women who had cancer of the breast, forty-seven were prolific.‡ It is very unusual to find both breasts attacked simultaneously, and quite rarely does the disease arise secondarily in the other breast. Of one hundred and forty cases, both breasts became diseased in seventeen; in these seventeen cases the right breast was first attacked in eight, the left in four instances.§

The average duration of life, from the time when the tumor was first observed, is four years; Mr. Paget says that in sixty-six cases, tabulated without selection, he finds it something more than forty-nine months. It is probable that the age at which the scirrhus tumor develops itself determines the duration of the disease, the earlier in life the disease commences, the more rapid is its course, for whenever the carcinomatous diathesis develops, a period

* Mr. W. M. Baker. *Med.-Chir. Trans.*, Vol. xix, 1862.

† These reasons probably also determine the greater frequency of cancer in women than in men. There are no organs in man corresponding with the breasts and the uterus which so early enter into degeneracy from a failure of nutrition. These organs should be compared with organs in man, at seventy, eighty or ninety years. M. Lebert assigns about thirty-seven, and Dr. Walshe not more than twenty-six per cent. as the proportion of cancer in men.

‡ This seems also to be true of uterine cancer. Dr. West's *Lectures on the Diseases of Women*; 3d edition. A *Clinical Report on Cancer of the Female Sexual Organs*; Dr. Tanner. London, 1863. Mr. Hewitt, *Diseases of Women*. Philadelphia, 1872.

§ Dr. Walshe believes that the left breast is more frequently diseased than the right gland, *loc. cit.*

of degeneracy is marked, and if this occurs in youth, there is less ability to resist the evolution of the poison, because the organism is not mature, and is therefore imperfect.

(2.) *Medullary cancer: soft cancer.*—Medullary cancer of the mammæ also has its origin in the epithelial cells which surround the glandular acini, but it is probable that soft cancers are frequently entirely composed of the connective tissue, which is situated between the lobes of the gland;* this connective tissue, however, is infected by the glandular secreting cells. The cells of medullary cancer are very large. They are masses of bioplasm, with nucleus and nucleolus in such close apposition as to be optically inseparable. They multiply by nuclear division,—only round the older cells, is a cell wall visible,—and early form a large tumor. The stroma is composed of connective tissue, but its trabeculæ are narrow, and the lumina very large. Upon this peculiar arrangement of the stroma and the cancer cells, depends in a great measure the softness of medullary tumors. The substance composing these tumors resembles the foetal brain, or adult brain partially decomposed and crushed; it can be easily pressed from the slightly harder connective tissue network. The color of a medullary mass varies from a dead white to a deep purple; this shading depends upon the quantity of blood which the growth contains and pigmentary infiltration.†

* A Manual of General Pathology. Ernst Wagner, *loc. cit.*

† Pigmentation, occurring either physiologically or pathologically, is probably never a true cellular metamorphosis, but in every case, an infiltration of the cell with the hæmatine of the blood corpuscles or melanin derived from the same source. The reason for considering this cellular change as one of infiltration, is, that in no instance has the formation or nature of the cell been known to be changed by the addition of coloring matter. Neither the nucleus nor cell wall is altered, the hæmatine crystals are suspended in the living material of the cell. The method by which this is accomplished does not appear plain, but it is probable that the cells take up the coloring matter of the blood corpuscles, or possibly the blood

A soft cancer is generally invested with a distinct capsule composed of connective tissue, from which thin partitions pass through the tumor. In these divisions the blood vessels, which are large, ramify. Sometimes the stroma becomes attenuated, or from the beginning of the growth there may have been no stroma, but in its place exists a network of blood vessels. (*Telangiectatic carcinoma, fungous hæmatodes.*) These cancers, even in their early stage, are distinguished by parenchymatous hemorrhages. The vessels seem to be defective in muscular contraction; this, with their large size, gives rise to frequent and profuse bleeding.

Medullary cancer, if we regard the length of time which a pathological growth may exist as a standard of malignancy, is more malignant than scirrhus. It is a more severe expression of the cancerous diathesis,* the constitutional symptoms are more grave in character, the growth more rapid, and the issue more speedy. It is a rare disease in the breast. Mr. Lebert says that in France one-fifth of the cases of cancer of the breast are medullary. The statistics of Germany and America agree with these conclusions. Medullary cancers belong to early and adult life, for there is a gradual ascent towards the maximum from the earliest periods of life to the fiftieth year; and then a gradual descent. The following table is taken from Mr. Paget's Surgical Pathology:—

corpuscles themselves, as they take up nutritious elements. The hæmatine is subjected to chemical changes, but does not dissolve within the infiltrated cells. Melanotic or medullary cancers, rarely scirrhus, infiltrated with pigment, are generally found in the vicinity of pigmentary moles, or are developed within the moles. They are observed in large numbers. Mr. Paget thinks they are not really more multiple than other soft cancers, but that their color renders them more noticeable.

* Antecedent Conditions of Cancer. Mr. Moore, *British Medical Journal*, August 20, 1865.

	Breast.	Soft parts of limbs and trunk.	Lymphatic glands and other parts.	Bones.	Eye and Orbit.	Testicles.	Total.
Before 10 years of age, . .	....	2	.....	4	15	4	25
Between 10 and 20 years of age,	6	.....	12	1	2	21	
" 20 " 30 " "	3	3	11	4	12	33	
" 30 " 40 " "	3	3	6	2	17	32	
" 40 " 50 " "	2	6	11	1	8	30	
" 50 " 60 " "	3	2	4	5	3	20	
Above 60 years of age, . .	1	.....	6	3	....	10	
	7	23	10	54	31	46	171

The tumor is soft and situated near the surface of the gland. The skin is elevated and tense, and ulcerates at an early stage of the disease. The axillary glands suffer the same disease which attacks the breast, they are early infected, and soon ulcerate. From these ulcerations large unhealthy granulations are developed, which discharge an offensive ichor, and sometimes bleed profusely.

The diseases of medullary cancer are chiefly three: atrophy, fatty and calcareous infiltrations.

Atrophy and spontaneous disappearance of medullary cancer is very rare; usually when it occurs the cure is deceptive, for the disease returns in a few months. No satisfactory explanation has been found for these apparent efforts of so malignant a growth to return to a state of health, but probably this process is connected with the plugging of the blood vessels with cancer cells.

Fatty infiltration does not differ from the same changes in scirrhus. It forms a part of the state of atrophy. The cancer cells lose their functional power, become yellowish-white, friable, and greasy to the touch, in a state of what

Rokitansky has called "saponification." The cancer cells are finally metamorphosed into granular corpuscles.

Calcareous infiltration is also very rare, possibly more so than the two preceding forms of degeneration. This infiltration is the reverse of the ordinary fatty degeneration. The latter is dependent upon certain changes within the cell, and only in a slight degree caused by a substance from without invading the cell wall; the former, calcareous degeneration, is truly an infiltration. The solvent of the carbonates and phosphates of lime contained in the blood, is mainly free carbonic acid. This acid, for some unexplained reason, leaves the blood to become more generally diffused, and thus the insoluble salts remain. The deposit of the limy salts is always attended with an increased flow of blood to the parts, and a certain degree of stagnation of the nutritive fluid. Usually only the stroma is affected. In either event—the calcification of the connective tissue, or of the cells—the disease is arrested at that place: in one instance by placing a boundary to cellular increase, in the other by destroying the vitality and multiplying capacity of the cells.

Cysts are very frequently developed in medullary cancers. We do not here refer to those cysts which arise independently of the cancerous disease, and which are only by the growth of the carcinoma included within it, but speak of the cysts which are developed in a medullary tumor. They are probably formed either by the dilatation of a milk duct before it has become entirely closed, or by a collection of mucus in a lumina of the stroma, which subsequently becomes circumscribed. The presence of cysts in melanoid cancers, has been considered sufficient ground upon which to form a separate variety of carcinoma, *Colloid*, *Alveolar*, *Gelatiniform*, *Gum* and *Cystic cancer*. The cancer itself differs in no essential from other encephaloid masses, and it seems advisable to regard the development of cysts in cancers as a disease, and not as a peculiar variety of carcinoma. The cysts are filled

with serum, variously tinted, or with blood; they are also sometimes filled with solid cancerous substances. They are occasionally so numerous as to crowd out and displace the carcinomatous material, which only fills the interspaces between them. Possibly the disappearance of some medullary cancers depends upon the development of cysts within their parenchyma. The cells, from pressure, deprived of nourishment would die, and the cyst contents becoming absorbed—a not infrequent occurrence—the tumor would disappear. Cysts have been observed most frequently in those medullary tumors which develop rapidly.

TREATMENT.—The treatment of a disease, the mortality of which is about ninety-nine per cent., becomes of the first importance, and we have to ask ourselves the reason of previous failure, that happily the answer elicited shall lead to some more successful means of treatment. Our first postulate, that carcinoma is primarily a dyscrasia, may sufficiently explain the hitherto negative results in endeavoring to eradicate a constitutional disease, by removing a local symptom. If the cancerous poison was concentrated in the local neoplasm, that is to say, if the carcinomatous tumor in its development drew to itself and used all of the poison from the system, then a reasonable hope might be entertained of a cure by an operation, but there are no data to warrant the belief in such a method of growth of the cancerous tumor; the opposite is more clearly proven. The difficulty in removing cancer, lies in this: that the first stage of the disease, the incubating stage, during which the organism is becoming thoroughly infected with the poison, is not recognizable, and neither local nor general symptoms can be treated; but we believe that if the hereditary nature of carcinoma were more generally acknowledged, treatment in early life would in many instances arrest the further development of the disease, and possibly destroy the morbid tendency, so as to prevent its transmission from parent to offspring.

Since, therefore, the dyscrasia is not cured by operative means,* it becomes our duty to inquire whether life can be prolonged by such treatment. In sixty-six cases of scirrhus, allowed to run without operative interference, the average duration of life was a little over forty-nine months; in forty-seven cases in which the tumor was removed once or more, the average duration of life from the first observation of the disease, was again a little over four years.† In eighty-four cases, without operation, the average duration of life was forty-three months; in sixty-six cases upon which operations had been performed, the average was 55·6 months. Mr. Sibley's tables show in cases of removal of the breast, 56·6 months; one of non-removal, 32·25 months.‡

The course of medullary cancer is more rapid than that of scirrhus. From a table of fifty cases, in which no organ essential to life was involved, which ran their course without operative interference, the average duration of life was rather more than two years; in forty-six cases in which the cancer was removed, the average duration of life was twenty-eight months. In still another table, Mr. Baker's, thirty-two cases not submitted to an operation, show an average duration of twenty months; sixteen cases operated on, 33·4 months. These cases are tabulated without selection. Statistics which included only such cancers as did not involve an organ whose function was necessary to life, would be more trustworthy.

Scirrhus generally returns within a year after its removal, but this depends upon the time at which the operation is

* Mr. Jonathan Hutchinson believes that if the tumor is removed in its early stages, the disease could thereby be eradicated. *The Lancet*, March 3d, 1874.

† Surgical Pathology. Sir James Paget, *loc. cit.*

‡ Med.-Chir. Trans., Vol. xlii.

performed, for probably the age of the tumor is not without influence in causing its rapid or slow return.

TIME OF OPERATION.	TIME OF RECURRENCE.			No. of cases.
	Within 6 months.	Between 6 & 12 months.	More than 12 months.	
Under 3 months,	4	2	2	8
Between 3 and 6 months,	5	2	2	9
“ 6 “ 12 “	5	4	5	14
“ 12 “ 24 “	9	1	3	13
“ 24 “ 48 “	7	3	2	12
	<hr/> 31	<hr/> 12	<hr/> 14	<hr/> 56

The time of the recurrence of medullary cancer, is more rapid. In thirty-eight cases, the average interval between the operation and the return of the disease, was seven months. In the following table containing thirty-eight cases of soft cancer, the disease returned in between

1 and 3 months, in 18 cases.					
3	“	6	“	“	11
6	“	12	“	“	4
12	“	24	“	“	3
24	“	36	“	“	2

This table compared with one relating to scirrhus cancer, clearly shows the greater rapidity of medullary growths. The scirrhus disease reappeared in between

1 and 3 months, in 4 cases.					
3	“	6	“	“	3
6	“	12	“	“	1
2	“	3 years,	“	2	“
5	“	7	“	“	2

From these data, it appears that without any hope of effecting a cure of the constitutional disease, life may be prolonged by an operation. The advantages would doubtless be greater in well selected cases, such as are not far advanced, and before severe complications ensue. As there is an infection from the primary local disease, as well

as from the dyscrasia, the earliest opportunity should be embraced for operating, and, if possible, before constitutional symptoms are developed.

But operative interference is only a palliative, and a means of delaying, for a few months at the most, the fatal result. No treatment can be successful, but such as is directed towards the disease itself. Therefore let us search diligently the history of our patients, and make ourselves masters of their constitution; let us, by careful prescribing, seek to restore the organism to a healthy standard, for only in this way can the great constitutional diseases, tuberculosis, syphilis, and cancer, be cured.

For the cancerous tumor, the following medicines have been used, with varying success:

SCIRRHUS.—*Apis, Arn., Ars., Asterias rub., Badiaga, Bell., Bromine, Calc. c., Carbo an., Carbo veg., Clematis, Conium. Nux v., Phos., Sepia, Silicia, Staph., Sulph.*

MEDULLARY CANCER.—*Acetic acid, Ars., Asterias rub., Carbo a., Caust., Chel., China, Cistus c., Cund., Guaco, Hydrastis, Iodide of ars., Kreosotum, Phytol., Puls., Rhus, Rumex, Sepia, Squilla, Trifol. ignat.*

2. *Enchondroma; Cartilaginous Tumors.*—Cartilaginous tumors were first recognized microscopically by Johanns Muller, and were called by him enchondroma. They consist of a tissue which resembles foetal cartilage, and are made up of either one mass, or of many nodules connected by areolar tissue; in one instance, the tumor presents a uniform surface, in the other, its surface is nodulated. Enchondroma vary in consistency, being sometimes hard and unyielding, at other times soft, almost mucilaginous. They are generally in combination with some other tissues, connective, fatty or osseous, and often developed in abnormal growths, but with these latter we are not at present concerned. Cartilaginous tumors are supplied with blood by means of the vessels which exist in the connective tissue with which they are surrounded; for being a non-vascular

tissue, cartilage is nourished by the passage of the nutritive fluid from cell to cell.

This peripheral nourishment is limited by the size of the growth; therefore, when the mass, normal, as in bone, or abnormal, as in enchondroma, has acquired a certain volume, a canal forms in its centre, and this opening supplies the inner parts of the tumor with blood.* If the tumor contains a large proportion of connective tissue, it may become very vascular; this condition generally precedes ossification, or a teleangiectatic development.† Though cartilaginous tumors bear a striking likeness to fœtal cartilage, the arrangement of their microscopic constituents is in some particulars quite unlike that of hyaline tissue. These dissimilarities consist chiefly in the number, size, and shape of the cells and nuclei, and are not infrequently found in different parts of the same tumor. Mr. Paget has truly remarked that this peculiar anatomical structure has no parallel in innocent tumors: it seems to be the only exception to the pathological rule enunciated by Bruch‡—that diversity of microscopic elements was a characteristic of cancerous tumors.

Cartilaginous tumors are of rare occurrence in the breast.§ In this organ they probably in every instance arise in the interacinus tissue in a process which induces the connective corpuscles to develop or metamorphose into indifferent cells, from which cartilage cells proceed. Such processes are connected with malnutrition, for enchondroma probably never occur in the breast, excepting in connection with, or as a result of, chronic inflammation, or the slow formation of pus.

* Surgical Pathology. Dr. Edward Rindfleisch, *loc. cit.*

† Manual of General Pathology. Ernst Wagner, *loc. cit.*

‡ *Die Diagnose der bösartige Geschwulste.*

§ Their most frequent situation is in connection with the shafts of long bones, either as an internal development or a growth beneath the periosteum, and in the thyroid gland.

The changes which occur in cartilaginous tumors are both developmental and degenerative. The developmental changes appear in the form of ossification. This process obtains frequently in enchondroma.* The ossific deposit, or development, does not resemble true bone, but is nearer allied to a deposit of amorphous calcareous matter. The calcareous substance may be found either in the centre or upon the surface of the tumor; the location corresponds to the focus of the inflammatory action.

The degenerative changes are chiefly those of softening. A hard cartilaginous growth, through derangement of its nutrition—whether this relates to an increased or a diminished supply of blood, it is in every case impossible to determine—may become through fatty degeneration, extremely soft, even liquid, and assume various colors, according to the quantity of hæmatine which it contains. Sometimes the substance of these metamorphosed enchondroma resembles synovial fluid; Virchow has called such tumors *Enchondroma Mucosum*.

Cartilaginous tumors belong to the period of youth; they are usually single, grow slowly, and enlarge concentrically. They have been, in the majority of instances, attributed to an injury; but there is reason to believe that their origin is more deeply seated. When the tumors multiply, it is usually by an extension of the disease through the lymphatics; in this way tumors may be developed in almost any part of the body—most frequently, however, in the lungs. The soft varieties of enchondroma are more favorable to secondary deposits than the more solid forms.

The diagnosis is not usually difficult, though sometimes the softness of the growth may lead to the suspicion that the tumor is a cyst. In general, however, the hardness of the mass, the healthy condition of the surrounding skin

* General Surgical Pathology and Therapeutics. Dr. Theodore Billroth, *loc. cit.*

and integuments, the unaffected health of the patient—though sometimes the growth is the seat of severe pain—and the absence of any disposition to unhealthy ulcerations, will present a picture which is not often counterfeited.

The prognosis is favorable, though undoubted instances are reported, in which the disease has returned after removal. The number and size of the tumors may cause death by interfering with the functional activity of the part invaded; the seriousness of the disease is in consonance with the importance of the organ affected.

TREATMENT.—There seems to be but one radical cure for enchondroma—excision. This operation involves but little risk. If the tumor is large, it may be necessary to remove the entire breast; even when small, a considerable portion of healthy tissue must be excised, together with the diseased mass, for it is impossible to enucleate the tumor. The medicines from which much may be expected, and which should be patiently exhibited before deciding upon an operation, are, *Baryt.*, *Cal. c.*, *Graph.*, *Hepar*, *Led.*, *Scp.*, *Sil.*, *Sulph.*

3. *Osteoma, osseous tumors.*—The development of osteoma resembles the normal development of osseous tissue in this, they are both infiltrations. We have not here to do with the hypertrophy of bone, but only with those heteroplastic tumors, which depend upon an independent growth of bony tissue. Osseous tumors in the breast are extremely rare; they probably in all instances originate in cartilaginous tumors by a natural process of development; or as a calcification of the walls of the milk ducts, and subsequent closure of the canal, a process similar to that which obtains in the calcification of arteries. They also sometimes arise in old abscesses, and in chronic inflammation of the breast. The causes of calcareous infiltration are not always clear. There is probably in the system a deficiency of the natural solvent of the salts of the phos-

phate and carbonate of lime—free carbonic acid—and the apt locality for the precipitation which thus ensues, seems in some instances to be determined by slowness or stagnation of the circulation. This is shown in the ossification of enchondroma, which always occurs in those parts which are farthest removed from the periphery, where the circulation is the most active. Osseous tumors are but imperfect imitations of bony tissue; they are the basis substance, or the cells, replaced by the salts which are found in bone, but the mass thus formed has not the peculiar system of canals, canaliculi or lacunæ, which are a part of bone.

Osseous tumors occur in the breast in two principal forms, either as hard, round or oval masses, generally irregular, or the mammæ may be traversed by plates and septa of calcareous deposits, or osteo-calcareous needles; instances of this formation are mentioned by M. Velpeau;* they probably originate a calcification of the walls of the lacteal ducts. Morgagni, Bonnet, Wolf, and others, quote instances of the ossification of the entire breast, and A. Bérard reports the case of a nun, whose chest, beneath its integuments, was completely ossified. This case, as M. Velpeau has remarked, was probably an example *cancer en cuirasse*. These forms are, however, exceptionally encountered, and have not been well attested. When enchondroma ossify, there are usually several points of ossification scattered irregularly throughout the tumor, or the tumor may be surrounded by a shell of bone.

Osseous tumors belong to the latter periods of life. Their growth is usually very slow. A case of osteoma came under the observation of Sir Astley Cooper, which had existed for fourteen years, and Morgagni reports a case which had existed for thirty years, without undergoing any acute change. They are usually accompanied with considerable pain, and their size may occasion much inconvenience; further than this they produce no marked alteration of the general health.

* Diseases of the Breast, *loc cit.*

TREATMENT.—Amputation of the breast, or of that part of it which is occupied by the tumor, is generally the best means of treatment, and in the majority of instances, the only one in the hands of the surgeon. But in osteoma, because of their slow growth, and indisposition to a fatal termination perhaps more frequently than any other tumors of the breast, will be found an opportunity for medicinal treatment, before an operation is resorted to. The following medicines may be studied with advantage, though in each case the totality of the symptoms must be prescribed for. *Assaf., Aur., Baryta, Calc., Cin., Dulc., Graph., Hepar, Lach., Mez., Merc., Nit. ac., Phos., Rhus., Ruta, Sil., Staph., Sulph.*

4. *Cysts, Cystoma.*—Cystic tumors are fibrous sacs, which contain a wholly or partially fluid substance. This substance is to be regarded, either as the natural product of the endothelium which lines the cyst wall, or as an endogenous growth. This definition does not exclude normal formations, as bursæ, glands, etc., but the cystic tumor is an abnormal growth, and contains pathological substances; herein is the distinction to be made.

The origin of cysts may be referred to one of three processes: I. Enlargement of the spaces or areolæ in connective tissue, in which spaces, fluids accumulate, gradually the boundary tissue becomes condensed, and a secreting wall is formed. II. Dilatation, growth and subsequent closure of natural ducts, or gland acini. III. Expansion of newly-formed cells, which pursue a morbid course from their beginning or a very early period of their development.

The contents of cysts vary in character and consistency. In some cysts, serous, hæmatic, it is liquid, variously colored with hæmatine, while in others, the intra-cystic space may be entirely occupied by a more or less solid mass, often extremely vascular, and highly organized. Between the two extremes there is to be found every gradation of firmness.

The cyst wall is usually composed of fine, well formed connective tissue, and elastic fibres. It consists of a single layer or of many layers which are separable; the inner layer constitutes an epithelium of cells, generally of the tessellated variety. The epithelial structure is sometimes wanting in large cysts, its place being occupied by a "nucleated, structureless and striated blastema, at the circumference of which the oval nuclei are in the act of splitting into fibres in the direction of their long axis."* Ciliated epithelium is sometimes observed. The cyst walls are firmly connected with the adjacent structures, from whence they derive the blood vessels which ramify upon their surface.

Mammary cysts, in their mode of origin, do not differ from cysts in other organs, though it seems probable that they arise most frequently in a dilatation of the lacteal ducts,—cysts of retention,—or in an overgrowth of a gland cell,—autoginous cysts.† The latter cysts present a feature of the course pursued in the development of some true pathological growths. Both originate in a deformity of the nucleus, but in one instance, the nucleus expands, and by acquiring the laminar and nucleated fibrous tissue, forms the cyst wall, while in the other, by multiplication of the cell formed after the type of the original erring nucleus and cells, the mass gradually assumes the form of some solid neoplasm.

* Pathological Anatomy, *loc. cit.* Rokitansky.

† Mr. Birkett (Diseases of the Breast, *loc. cit.*) divides mammary cysts into two classes: "I. Cysts depending upon dilatation and a morbid condition of the lacteal ducts or acini. II. Cysts produced by a peculiar action in the fibro-cellular envelope of the gland tissue, and the consequence of a morbid state of the function of nutrition." Probably mammary cysts only rarely arise in the inter-acinus tissue of the gland. From their situation they may have the appearance of development *in loco*, but in their early stages these growths are usually attached to the gland tissue, especially if the cyst is of the proliferous variety. By the formation of a condensed cellular envelope, and thereby the establishment of a new and abundant vascular supply, the union with the gland may be destroyed.

Mammary cysts may be conveniently divided into simple cysts and compound cysts. The latter are the most important pathologically and clinically; pathologically, because they sometimes contain highly organized substances, which bear a close resemblance to natural tissues; and clinically, because they are not infrequently confounded with more dangerous growths.

A. Simple Cysts contain only liquids, and these partake more or less of the nature of the secretion of the part in which the cysts occur, unless the disease is the result of an accident, when the tumor contains a variable quantity of blood. Hæmatic cysts have not always a traumatic origin, but sometimes arise from the accidental rupture of a capillary vessel. Mr. Paget has observed that cysts which are from the first hæmatic, usually remain fluid; but that the contents of cysts which are rendered hæmatic by an effusion of blood, soon coagulate.

a. Serous Cysts, Hygromata, are the most commonly developed; in the mammary gland they are usually formed of dilated lacteal ducts, and contain, if they are developed during lactation, milk in its natural state, or the more solid constituents of milk, fatty matter, epithelial cells, etc., or they may be filled with the serum of milk. The walls of serous cysts are usually lined with flat epithelium. Their connection with, and origin in, lacteal ducts, is demonstrated by the possibility of their being evacuated through the nipple, by pressure. The necessary conditions for the development of these cysts of retention, are either a temporary or permanent closure of the excretory duct,—this may be partial or complete, and the result of external pressure, or contraction from irritation,—or unnatural thickness of the normal fluid, generally the result of error in nutrition, or rapid absorption of the watery elements of the milk. Such absorption always occurs, if the milk remains stagnant in the lacteal tubes for any length of time.

Serous cysts are either single or multiple. When single, they may attain an enormous size, in some instances they have been found to hold over a pint of fluid.* They may be developed in any portion of the gland, but perhaps are more frequently situated near the nipple; they sometimes occupy the entire breast. They are rarely attended with suffering, though sometimes a slight sensitiveness is experienced during the menstrual period. The general health remains unaffected, and menstruation continues regular.

A cyst of this kind is first observed as a small solid tumor in one of the situations indicated. It is movable, increases slowly in size, and generally exhibits signs of fluctuation. The majority of patients affected are young; marriage seems not to influence their development.

When the cysts are multiple, the conditions are different. Mr. Birkett divides them into two classes. In the first class the fluid is mucoid, turbid, of a greenish tint. These he attributes to a morbid condition of the lacteal ducts. The second class contains a glazy, tenacious fluid, or clear serum of a reddish tint; these he regards as true serocysts. The cysts are small, and scattered through the gland substance—not arranged in groups. The gland seems partially indurated, and resembles cirrhosis of the liver.† The cysts are usually very small, their walls thin, tough and tense, and filled with a fluid, of various colors, much denser than serum. The accidental coincidence of a cyst of this nature with cancer, gives rise to the bloody dis-

* *Medical Times*, January 4th, 11th, 1845.

† Dr. Crombee, House Surgeon to the Cancer Hospital, reports the following case (*The Lancet*, Sept. 7th, 1872): "Dr. Marsden removed the breast from a woman who had ceased to suckle ten months before, because of soreness of that nipple. There had been no pain. Examination showed no glandular structure, but in its place, a dense, solid material, hard, grayish and elastic, with no appearance of structure, and surrounded by a number of small cysts, full of rich, yellow, cheesy or creamy matter, evidently inspissated secretion of the gland."

charge sometimes observed to flow from the nipple, in the latter disease. Occasionally, one very large cyst is found surrounded by many smaller cysts. The general health usually remains good.

Multiple serous cysts are first observed as small, hard lumps, or, rather, as an unevenness of the surface of the gland, frequently immediately after parturition. The tumors vary in their rate of growth, sometimes increasing very rapidly, at other times with equal slowness. The skin is unaffected, but these cysts are liable to ulcerate, either *en masse* or singly. The axillary glands may enlarge, but they do not seem to undergo changes similar to those in the breast. The patients have usually attained, or passed beyond, the middle period of life, and may be single or married, prolific or sterile. As with the majority of mammary tumors, cysts are frequently attributed to a blow, but too much credence should not be placed in this or analogous statements of a patient.

B. Proliferous Cysts; Scro-Cystic Tumors of Sir B. Brodie. —This variety of cystic growth may be divided into three classes: I. Secondary cysts are found within the parietes of the primary cyst; these may give rise to a third and fourth generation of cysts. II. Cysts are developed upon the inner wall of the parent cyst, and project into its cavity; these also may develop tertiary cysts. III. The intracystic growth is not bounded by a secondary cystic wall, and partakes of a more or less highly vitalized tissue. In every instance it is not possible to distinguish between these classes, for sometimes all three are combined in one cyst. The walls consist of dense, reticulated areolar tissue, with or without elastic fibres, and are lined with an epithelium, which, in many instances, is reflected over the intracystic growth. The walls are abundantly supplied with blood, and adhere closely to the surrounding structures. The vessels, which are large, are generally not new vessels, but normal ones increased in size.

The intra-cystic growth varies from a hard, almost fibrous mass, to a structure which resembles imperfectly organized fibrin.* Sometimes it appears as an irregular mass of cells and nuclei.† Frequently it resembles the gland structure, and this circumstance has induced some pathologists to believe that many, if not all, adenoma—chronic mammary tumors—originate in cysts. Or the solid growth bears a likeness to granulations or cauliflower excrescences, which are highly vascularized, or the entire mass may be composed of minute cysts, which are very numerous, and attached to the primary cyst wall, and to each other, by narrow pedicles.

Not infrequently the intra-cystic growth increases in size faster than the enveloping walls. From this cause, all the fluid which the cyst originally contained is excluded, and the sac becomes a solid tumor. If the intra-cystic growth continues, the result is that the cyst wall becomes anæmic from internal pressure, and finally ulcerates.

It may be questioned, whether the intra-cystic growths really spring from the inner wall of the cyst. Mr. Birkett believes that they are more or less connected with the gland tissue; that they grow eccentrically as regards the gland, and never concentrically. This may obtain: the surrounding gland tissue growing abnormally in one direction, projects into the cystic cavity where the least resistance is offered; but undoubtedly, some proliferous cysts cannot be explained in this way—those which are attached only by a very narrow base, for instance. Intra-cystic growths are sometimes found with cysts developed in their substance; these secondary cysts contain variously organized and colored fluids. From the growth of the solid mass, they may become entirely obliterated. Intra-cystic growths, moreover, are subject to degeneration; are more liable to degenerate than normally-developed tissues.

* Pathological and Surgical Observations. Sir R. Brodie.

† Dr. Mettenheimer, Muller Archiv., 1850.

The origin of proliferous cysts cannot be distinguished from that of the simple varieties of cystic tumors. They are probably, in the majority of instances, closed lacteal ducts, the epithelium of which, by a process of involution, becomes changed in function, and gives rise to a solid growth, in the place of its natural fluid growth—milk. It is very probable, also, that proliferous cysts are at first filled with some fluid, and that the solid growth is a later development.

Proliferous mammary cysts may grow to an enormous size. Mr. Liston removed one which weighed twelve pounds, and Dr. Warren* removed one which weighed thirteen pounds.

Proliferous cysts are observed, most frequently, before the age of thirty-five; they may occur later, but, probably, never after the cessation of the catamenia. Generally, unmarried are more obnoxious to these tumors, than married women. The general health is unaffected. Their presence, unless very large, does not interfere with suckling. They are sometimes accompanied with quite severe pains, especially during menstruation. The axillary glands remain healthy, unless ulceration occurs in the breast; then they may enlarge, and become painful, but the affection is harmless, and will disappear with the removal of the exciting cause. But this circumstance proves that some morbid material is conveyed from the primary seat of the disease through the lymphatics; and also that the disease is local, and will remain so.

The usual course of cystic tumors of the breast is towards ulceration, the cause of which is found in the excessive distention to which the cyst wall is subjected as the growth of the intra-cystic substances continues. The ulceration is not malignant, but may assume an angry appearance when fungoid granulations springing from the interior of the cyst, protrude from the ulcerated cavity.

* Surgical Observations on Tumors, *loc. cit.*

TREATMENT.—It is generally advisable to remove a cystic tumor of the breast: *First*, because its size may give rise to troublesome complications; *second*, because the mental anxiety which usually attends the presence of a tumor of any kind in this location, may lead to serious nervous consequences.

The most satisfactory method of treating mammary cysts, is amputation of the entire breast. This may seem an unnecessarily severe course of treatment to pursue, but the cyst wall adheres so intimately to the surrounding gland tissue, that in most cases the two cannot be separated, and in the majority of instances the cysts are multiple; the impracticability of dissecting out each cyst needs no demonstration. Therefore, generally speaking, it is best to remove the breast, or as much of it as seems to be diseased. There are exceptions to this rule, as when the case is one of single simple cyst. These may be evacuated by means of an incision, or the trocar, and either the wound kept open with a piece of lint—after the cyst cavity has been thoroughly washed with a solution of carbolic acid, in the proportion of $\frac{1}{10}$ at first, and if repeated, $\frac{1}{1000}$, or a seton may be introduced and allowed to remain until union is established between the walls of the sac. But fistulæ are apt to follow such treatment, and these fistulæ are difficult to heal.

Another exception may exist when the tumor is a single proliferous cyst. This solid growth is to be removed with a portion of the gland tissue, in the same manner that other solid mammary tumors are removed. But single mammary cysts are extremely rare, and the probable existence of other cysts will give rise to doubt as to the advisability of performing one of these operations. Electricity has been employed with some success for the removal of cysts. Its sphere is probably limited to cysts which contain fluid only.* Pressure, long continued, has been recom-

* Electricity is at present almost unknown as a therapeutic agent, but its use is daily becoming more extensive. In causing the ab-

mended, but this is very irksome to the patient, and is rarely successful.

The breast is conveniently removed with Mr. Richardson's serrated scissors, and very excellent results have followed the use of a carbolized oil dressing.* The following medicines may be studied: *Apis.*, *Calc.*, *Graph.*, *Lach.*, *Hepar.*, *Sil.*

SPECIAL THERAPEUTICS.

Alumina.—Stitching pains in the left breast in the morning. Several cases of cancer of the mammæ are reported to have been cured, or relieved, with *Alum.* *Very profuse* leucorrhœa; constipation from dryness of the rectum. Weakness after the menses. Adapted to thin, dry subjects, and old persons. Left side.

Ammonium c.—The right breast is painful when touched. Menses premature, consisting of black clots; leucorrhœa profuse and acrid. Chronic headaches. Lips dry and cracked. Weakness of the limbs. The moment she falls asleep, she is roused by a feeling of suffocation. The later she goes to bed, the less she can sleep. Right side.

Apis mel.—Redness of the breasts, with stinging pains; swelling and hardness of the breasts; spots like bee stings.

sorption of fluids, it probably acts in one of two ways: either by changing the quality of the liquid, renders it capable of being absorbed, or by acting upon the muscular coat of the lymphatics (see works of Wm. Hewson, Sydenham Society, 1847), stimulates them to more ready absorption.

* A case of cystic sarcoma of the breast is reported in the *Hospital Gazette*, for May, 1877. The patient was in the care of Prof. Johnston, University Hospital, Baltimore. The entire breast was removed, and the open plan of treatment was adopted for its removal. The granulating surface was dressed daily with cotton saturated in carbolized oil, of the proportions: carbolic acid one drachm, boiled linseed oil ten drachms. On the eighth day following the operation the patient was able to return to her home.

Mental depression. Very sleepy. Scanty urine. No thirst. No periodicity in the recurrence of the symptoms. *Aggravated* by heat; *relieved* by the application of cold water.

Argent. nit.—The right mammary gland towards the axilla is painful as if ulcerated, especially when touched; when stretching the arm away from the body, an oblong tumor is found in the breast. Tension of the axillary glands. Metamorphosis of tissues. Dizziness in the morning. Urine passes very slowly. Belching of wind. Weakness of the legs. Increased cheerfulness, and a disposition to be loquacious.

Arnica mont.—Hardness of the breasts; traumatic erysipelas of the breasts; great sensitiveness of the breasts, she fears that they will be touched by persons approaching her. The nipples are sore and excoriated; itching of the nipples. Drowsiness during the day; wakeful until 2 or 3 o'clock A.M. *Aggravated* in the evening, at night, and by motion; *relieved* by lying down. Right side.

Arsenicum a.—Burning pains, as if a hot iron was thrust into the breast. Pains gradually increase until they reach their climax, then as gradually decrease. Skin dark, threatened gangrene; dryness of the mouth, with thirst for small quantities of cold water; water causes pains and distress in the stomach. Pulse irregular and weak; night sweats. Diseases caused by sea bathing. Loss of strength with emaciation. *Aggravated* in the evening, after midnight, and by cold; *relieved* by warmth. Right side.

Asterias rub.—Cancer, especially of the left breast; swelling and distention of the breasts as before the menses. A feeling as if the breast was being drawn inwards. Drawing pain towards the inner portion of the chest, from before backwards, under the left breast; this pain, which extends down the inner side of the arm to the end of the little finger, begins in the evening and lasts until the following morning. The head feels hot, as if surrounded by hot air.

Badiaga.—From its profound action upon glands, ought to be considered in tumors of the mammæ, when not attended with marked inflammation.

Baryta carb.—Tearing and lancinating in the mammary gland. Swelling and induration of glands; menses very scanty; cannot lie on the left side; chronic swelling of the tonsils. Left side. *Aggravated* by motion, and in the open air.

Berberis vulg.—Sticking pains in the mammæ, pressing from within outwards between the mammary gland and the walls of the chest, more violent behind the nipple; sensation as if the breasts were swollen; vagina very sensitive, soreness and burning especially near the labia; many urinary troubles, usually *aggravated* in the afternoon. Left side.

Belladonna.—Hardness and swelling of the breasts; breasts heavy and bright red, very sensitive when touched; nipples sore at every menstruation; red streaks spreading in radii from the nipple along the course of the milk ducts. Pains shooting and tearing, spreading in radii; throbbing and stitching pains; pains come and go suddenly. Stupid feeling; constant drowsiness. Cephalalgia with congestion of the head; dry burning heat; pulse strong and quick; mouth dry, with little thirst; plethoric habit. *Aggravated* in the afternoon about 3 o'clock. Right side.

Borax.—Sensation of constriction in the left mamma when the child nurses from the right breast; nipples aphthous and bleed. Skin difficult to heal. Aphthæ on the tongue and mouth, which bleed when eating; milk curdles quickly, after it has flowed from the breast. Menses too early and profuse; urine fetid; desire for milk. *Aggravated* in damp weather.

Bromine.—After the extirpation of a hard tumor in the left breast there appears a hard, uneven tumor in the right breast, which has formed adhesions to the surrounding parts; periodical lancinating pains, especially at night, made worse

by pressure; suppression of the menses. Headache after taking milk; cannot lie on the left side. Swelling and induration of glands; grayish, earthy complexion; light hair, blue eyes. Great depression of spirits. *Aggravated* from evening until midnight.

Bryonia.—Lumps in the breast; tension and shooting pains in the tumor. Breasts heavy; swelling not red; hardness of the breasts; diminished secretion of milk. Pain in the head; dizziness when rising, or when sitting. Chill, followed by fever. Constipation; stools as if burned; thirst for large quantities, but infrequent; puerperal fever. *Aggravated* before midnight, towards 9 P.M., by lying on the healthy side; *relieved* by cold, and lying on the painful side. Right side.

Calc. c.—Pains as of ecchymosis of the breast; swelling and heat of the right mamma, which is painful to the touch; breasts distended; milk scanty. She is cold, and there seems to be an absence of sufficient vitality to bring the milk forward; soreness of the nipples, swelling and inflammation of the left nipple, with stitches; affections at the commencement of the new moon; rush of blood to the head; depression of spirits with forebodings of some misfortune; out of breath from going up stairs; very sensitive to the least cold air. She feels as if she had on cold, wet stockings; aching in the vagina; anxious towards evening; menses too early and profuse, the discharge is *per saltum*. Cannot drink milk. Can bear nothing tight around the abdomen; swelling of the cervical glands. *Aggravated* by touch, by any current of air, either warm or cold, and by excitement. Left side.

Calc. ax. has more than any other remedy relieved the terrible pains in open cancer. Cancer of the left breast with intense agonizing pains.

Carbo a.—Breasts swollen and erysipelatous, particularly during confinement; nodosities in the breast; scirrhus; burning, tearing pains; induration of the axillary glands;

menstruation very exhausting; lochia long continued, and excoriating the parts; bitter taste in the mouth. *Aggravated* by pressure, in the evening, and when lying on the right side. Right side.

Carbo v.—Scirrhus of the breast; erysipelatous inflammation; excessive prostration; acrid morning sweat; foulness of all the secretions; desire for fresh air; excessive accumulation of flatus in the stomach and upper intestines; liability to take cold; menses premature and copious; itching, burning and excoriation of the vulva. *Aggravated* during warm, damp weather, after eating, and in the morning.

Causticum.—The nipples are excoriated, cracked, and surrounded by tetters; deficient secretion of milk; profuse leucorrhœa; stiffness of the back; pain in the coxo-femoral joint when coughing; great melancholy, especially during menstruation; menses early and profuse. *Aggravated* by drinking coffee, in the open air, in the evening, and while lying on the painless side. Right side.

Chamomilla.—Breasts inflamed, swollen and painful when touched. Erysipelas of the breasts, with soreness of the nipples; indurations of the breasts with burning, lancinating pains; scirrhus; suppression of milk; nursing is very painful. Irritable and impatient. Pains unendurable. It is difficult to speak pleasantly. Free sweat after eating or drinking; alternations of heat and cold; burning in the vagina; yellow, smarting leucorrhœa. *Aggravated* before midnight, by lying on the painless side, by the warmth of the bed, and during menstruation. Pains *relieved* after sweating.

Chimaphila u.—Scirrhus tumors of the mammæ; atrophy of the mammæ; hectic fever; urinary troubles.

Cicuta v.—Burning pains in the nipple. Shivering, with desire for the fire. Involuntary starting of the limbs; during the menses, tearing in the coccyx.

Cimicifuga racemosa.—Prickling sensation in both mammæ; aching, wavy pains in the left mamma. Great

melancholy; abortion in the early months of pregnancy; menstruation suppressed by a cold; restlessness in the afternoon; lameness of the back; sensation as if the top of the head would fly off; troubles caused by grief; pains paroxysmal.

Cistus can.—Inflammation from obstruction of the lacteal ducts; scrofulous habit; dryness and heat in the mouth; she is sensitive to the cold air. Coldness of the tongue and throat.

Clematis erecta.—Swelling and induration of the breasts; cancer (scirrhus?) of the breast. Fungus hæmatodes; vibrations through the whole body; sadness, with apprehension; face pale and sickly; stitches in the shoulders; she dislikes to be uncovered while perspiring; nocturnal paroxysms. *Aggravated* in cold weather, and during the increasing moon. Left side (?).

Comocladia den.—Acute, sharp, burning pains in the left mammary gland one inch above the nipple; the pain goes to the right side, and down the right arm. Sloughing ulcer of the right breast. When rising from bed, everything seems dark. Violent itching of the skin. *Relieved* by motion, and in the open air.

Conium m.—Scirrhus, following contusion. Inflammation with stitching pains. Itching of the nipples, with red, scaly skin. The mammæ are tender before the menses. Skin, dark red; swelling and hardness, with dull, aching pains. Sleepiness, with drooping of the eyelids, in the evening. Vertigo when looking backwards, and when turning in bed. She dislikes society, but dreads being alone. Great exhaustion. Burning, acrid and pungent leucorrhœa. *Aggravated* in the evening, in the morning, and in the cold; *relieved* when walking, and after becoming warm. Either side.

Cotyledon u.—Dull pain in the left nipple. Dull, broad pain from the left nipple to the front of the left

scapula. Dull pain in the right breast, two inches below the nipple. Dull pain in a small spot under the left nipple. Soreness of the right breast. Constant pain in the left breast, sometimes acute. There is much pain in the abdomen. Profuse urine. Various pains in the chest. *Aggravated* by walking, in the evening, when riding, and by pressure.

Crotalus may be useful when the ulcerated cancer is a dark red, with streaks of blood on its base. Hemorrhages from different parts of the body. Right side.

Croton tig.—Suckling is accompanied with an excruciating pain in the breast, which runs through to the corresponding scapula and arm. Increased heat throughout the body. Rheumatic pains in the large joints. Intense itching of the skin. Yellowish diarrhœa, which escapes suddenly, and with force.

Cuprum.—Swelling and induration of the mammæ. Distressing after pains, particularly in women who have borne many children. Scantiness or suppression of urine. The mind acts slowly. She shrinks from every one who approaches her. Restless. Gurgling noise, when drinking. Left side.

Dulcamara.—Suppression of the milk by a cold. Herpes on the breasts of nursing women. Left side.

Formica.—Violent penetrating itching of the right nipple; menses too early; nausea, with headache; rheumatism; deficiency of milk; troubles caused by cold and wet, cold bathing or damp weather. *Aggravated* from 2 to 4 A. M.; *relieved* (burning) by the application of cold water.

Gratiola o.—Darting in the right mamma, felt when bending the body, but worse when raising it again. Tearing in the milky breasts.

Graphites.—Nipples inflamed and cracked. Tettery eruption between the fingers, and on the scalp; styas; useful when there have been former ulcerations. Excoriations of

the skin. The milk is prevented from flowing by old cicatrices; pulsation throughout the body; fetid nocturnal perspiration; nostrils excoriated, with dry scabs in the nose. Black pores on the face and nose. Suppression of the menses; great prostration; will prevent the formation of pus. *Aggravated* at night and before midnight.

Gymnocladus c.—Pain in the right breast; stitches in the right breast during inspiration.

Hamamelis v.—Bleeding nipples, with excessive soreness.

Helonias d.—Breasts swollen, the nipples are painful and very sensitive, even to the pressure of the dress; intense pruritus of the vulva and vagina, with curdy secretion from the vulva; loss of sexual desire and power; uneasiness and weight in the region of the kidneys. *Prolapsus uteri.*

Hepar s. c.—Cracks in the breast and nipples; dull pain as during the formation of pus; when suppuration begins with frequent crawlings; tetters on different parts of the body, with a hard, yellow crust, from under the edges of which pus exudes; dry heat; sour nocturnal perspiration; thirst; she dislikes to be uncovered. Adapted to persons who have taken much mercury; should not be given too soon, lest suppuration is thereby accelerated. Pus scanty, excessive hardness of the inflamed parts. *Aggravated* at night. Right side.

Hydrastis c.—Scirrhus of the mammæ, hard, heavy, and adherent to the skin; the skin is dark, mottled and puckered. The nipple is retracted, with pains as if knives were thrust into the part. Cachectic countenance. Constipation. Hemorrhoids. Catarrh of the bladder. Tenacious leucorrhœa. Ulceration of the os, cervix, and vagina. Sensation of weakness in the stomach. Flushes of heat to the face, neck and hands. Irritable and indolent ulcers.

Iodine.—Acute pain in the breasts connected with metritis. Breasts sore and sensitive. Swelling of the

cervical glands. Heavy sensation in the breasts. Dark colored nodosities under the skin of both mammæ of the size of a hazel-nut, surmounted by black spots. Breasts hang down and are flacid. Atrophy of the breasts. Great weakness, especially when ascending the stairs. Leucorrhœa corrosive, staining the linen yellow, during the menses. *Aggravated* in the morning and at night, by mild contact; also in the warm open air, and by warmth generally. Left side.

Indigo.—Painful stinging in the mammæ, going away momentarily by rubbing the parts. Burning in the breasts. Menses anticipate eight days. *Aggravated* during rest, when sitting, in the afternoon and evening; *relieved* by rubbing, pressure, and motion.

Krcosotum.—Frequent drawing pains from the sides of the nipples. Stitches, as with a dull needle, under the left mammæ and right scapula, which arrest breathing. The breast is hard, bluish-red, and covered with little scurvy protuberances, from which blood oozes when the scurf is removed. Sensation as if milk would flow into the mammæ, with increased flabbiness. Menses too early. Appearance of the menses in the third month of pregnancy. Syphilitic taint. All the discharges are corrosive. Chilliness. Increased flow of urine, especially during the night.

Lachesis.—The breasts are of a purple or blue color. Hammering pains. Pressure on the tumor causes a pain in the left arm and shoulder. Open cancer, with black streaks of coagulated blood in the ulcer. Chronic leucorrhœa. Threatened gangrene. Chills at night; flushes of heat during the day. Troubles at the climacteric period. Pains in the left ovary. Pains in the uterus. An effort is required to speak. *Aggravated* after sleep, by pressure, by lying on the right side, or painless side; *relieved* after eating, and by the menstrual flow (uterine pains).

Lactuca v.—The quantity of milk in the breast is increased. Frequent and copious urination at night. Ill humor. Difficult respiration, with oppression of the chest. Rheumatic pains in the extremities.

Lilium t.—Severe cutting pains in the left mammary gland, extending through to the left shoulder blade. Crampy pains in the left breast, extending down the corresponding arm. Sharp pains in both breasts. The pains decrease until she has almost fallen asleep, when their renewed severity awakens her suddenly. Sub-acute inflammation. Uterine neuralgia, with cutting pains in the left ovary. Profound uterine troubles, with displacement, principally anteversion. Apprehensive concerning one's health and disease. All the symptoms return suddenly.

Lycopodium.—The nipples bleed, and are very sore. Swelling of the breasts, with nodosities. Engorgement of the mammæ. Red sand in the urine. Sensation of fermentation in the abdomen. Accumulation of wind in the small intestine. Chronic dryness of the vagina. The menses are too early and too profuse. Exceedingly putrid odor from the mouth. Fan-like motion of the ali nasi. Cough, with a gray, saltish expectoration. Cutting pains running from right to left; during the paroxysm of pain, she is obliged to walk about and weep. Fear of being left alone. *Aggravated* about 4 P. M., from warmth and rest; *relieved* after 8 or 9 P. M. Right side.

Mercurius.—Several abscesses in the breast. Hardness and soreness of the breasts. Ulcerated nipples. The child refuses the milk. Syphilitic origin. The gums recede from the teeth. The whole body feels sore, as if bruised. Coldness and shuddering through the body. Pains in the breasts at each menstrual period, as if they would ulcerate. Profuse sweat, without relief. After Belladonna. Pains periodical. *Aggravated* at night, in bed; *relieved* by cold. Left side.

Murex pur.—Violent pains in the breasts with acute stitches; darting pains in the mammæ; sharp shooting pains in the right side of the uterus from below upwards, across the thorax, to the left mammary gland; the menses are too early and too profuse; sexual organs easily excited by a touch, as during digital examination; leucorrhœa acrid, and sometimes bloody; distressing dreams; general lassitude and feebleness. *Aggravated* at night. Right side.

Natrum mur.—Lancinating pains in the breasts; the upper lip is swollen, cracked and dry. Headache which comes on in the morning, is at its height about noon, and gradually declines as the sun sets; great desire for salt, and aversion to bread. Gloomy and sad during the menses; dryness of the vagina, which is painful during coition; one half of the tongue feels stiff; menses retarded and diminished; complete indifference to the affairs of life. The discharges are all excoriating and biting. *Aggravated* in the morning about 10 o'clock; *relieved* in the open air, and while lying on the right side, or back.

Nitric acid.—Hard nodosities in the mammæ; hard lumps in the breast. Atrophy of the breast; shooting pains as if caused by splinters; the pains are felt during sleep. Syphilitic or mercurial taint; salivation; fissure of the anus; the urine smells like that of horses; menses too early and too profuse; leucorrhœa flesh-colored or greenish; sadness concerning one's health; swelling of the axillary glands, with suppuration; nausea relieved by moving, or riding in a carriage. *Aggravated* in the evening. Left side.

Nux m.—Breasts small, and without milk. Diminishes the milk of nursing women; between the breasts there is an offensive odor; chronic diarrhœa. Dryness of the mouth and tongue; suppression of the menses from exposure to dampness; skin dry, with no disposition to perspire. Flatulence, which disturbs sleep at night; sudden change of humor; disposed to laugh immoderately.

Aggravated in cold, damp weather, when lying on the painful side, and in the forenoon and evening. Very sensitive to the cold air.

Nux v.—The nipples are painful during suckling, with little or no soreness or rawness. Pain in the nipples as if milk would be secreted. Constipation during pregnancy; repugnance to the open air; uneasiness at 3 A. M.; malicious, irritable temperament; pain in the small of the back; hemorrhoids. *Aggravated* on rising in the morning, by turning in bed (back). Left side (?).

Oleum a.—Dull stitches around the lower portion of the left mamma, with painful tearing in the ring and middle fingers of the right hand; paralytic weakness in the limbs; sadness; aversion to meat; menses premature and scanty; stiffness of the neck. *Relieved* momentarily by rubbing (pains).

Petroleum.—Itching, with meally covering of the nipples; menses premature; sadness and discouragement; starting from trivial causes; marked sensitiveness of the skin; excessive weakness without apparent cause.

Phosphorus.—Phlegmonous inflammation; breasts swollen; hard knots; red in spots or streaks; fistulous openings which discharge a watery, discolored, offensive ichor; lymphatic abscesses; fungous hæmatodes; hacking cough, with hectic fever, and colliquative sweats; slender women, with white and tender skin, light hair and blue eyes; weakness from disease, or from loss of animal fluids; stinging and cutting pains; state of clairvoyance; desire to be mesmerized; great mental depression at twilight. Increased sexual desire; tongue white, with sour taste in the mouth; menses too early and profuse; tightness across the chest. *Aggravated* in the morning and evening, when lying on the back, and after a meal; *relieved* by quiet. Left side.

Phosphoric acid.—Milk scanty; weakness from loss of animal fluids; bad effects from sexual abuse. Large

quantities of colorless urine are voided at night. Profuse leucorrhœa. Pains in the bones. *Aggravated* in the morning and evening. Right side (?).

Phytolacca d. — Chill a few days after confinement, followed by fever, and painful engorgement and swelling of the breasts; hardness is apparent from the first; many hard, painful nodosities; abscesses of the breast; badly treated cases; large fistulous openings, and angry looking ulcers filled with unhealthy granulations which discharge a watery, fetid, ichorous pus; fissured nipples. The milk cannot be drawn, because of the cakes in the breast; when the child takes the nipple in its mouth, an exquisite pain radiates from the nipple all over the body, going to the spine, and streaking up and down the back, with excessive flow of milk, causing much exhaustion; constipation. *Aggravated* during moist weather.

Plantago m., without especial indications, has been used topically in erysipelatous inflammation of the breast; may also be useful when the origin of the trouble is traumatic. The internal administration will probably be more efficacious than the external use of the plant.

Plumbum.—Painful constriction in one or both breasts, during which they become hard. *Aggravated* at night. Right side.

Pulsatilla.—Swelling of the breasts, with pressure; tension as if milk would appear; painful sticking and a discharge of thin acrid milk; when nursing, a pain proceeds from the breasts into the neck, and down the back; the pains frequently change their location. Rheumatic pains proceeding from the breast to the upper part of the body. She cannot remain long in one place, but must move about to relieve the pains. Milk scanty. Pains pass rapidly from one place to another. Mild, tearful disposition; symptoms changeable; chilliness; no thirst. Diseases caused by wetting the feet; dizzy when rising from a chair, or when

looking up ; bitter taste in the mouth ; menses late or suppressed ; painful menstruation, there is no relief from the flow ; leucorrhœa profuse after the menses ; marked mental depression. *Aggravated* in the afternoon, evening, before midnight, and by warmth ; *relieved* by cold, and in the open air. Left side (?).

Rheum.—Pains and lancinations in the breast ; milk bitter and yellow ; numbness of the part of the body which is rested upon ; the hunger is satisfied with the first mouthful. Right side.

Rhus t.—Erysipelatous inflammation of the breast, with small vesicles ; inflammation arising from weaning, from a chill, and after getting wet. Breasts red and streaked ; painful distension of the breasts after delivery when the milk begins to flow ; coldness with the pains ; fever in the evening ; the lochia becomes red again ; after delivery there is a pain in the right leg, with numbness from the hip to the foot ; lochia remains too long and is thin and offensive ; cough after delivery. *Aggravated* after midnight, in damp weather, and during rest ; *relieved* by motion.

Sanguinaria c.—The breasts are sore when touched ; stitches in the breasts ; burning and pressing in the breasts ; stitches from the lower part of the left breast to the shoulder ; acute stitches in the right breast ; painful soreness of the nipples, pressure is painful. Headache like a flash of lightning over the occipital region. Menses too early. Flushes of heat at the change of life. Burning of the palms of the hands and soles of the feet. Severe neuralgic pains in all the muscles.

Secale c.—Stinging in the breasts ; deficiency of milk ; venous hemorrhage with exhaustion ; lochia thin and offensive ; menses early and profuse ; cachectic, scrawny women. Skin cold ; desire for cold air. Face pale and

eyes sunken. *Aggravated* before the menses and at night.

Sepia.—Stinging in the breasts with soreness of the nipples; deep cracks in the nipples; urine very offensive; sensation as if everything would fall out of the vulva, to prevent this she must cross her legs; stitching pains in the uterus; painful coition; itching of the vulva; lochia offensive and excoriating. Inflammation of pregnant women; profuse perspiration during the slightest movement; indifference to one's relatives. Wakes about 3 A.M., and cannot sleep again; feeling of goneness in the stomach; anxious concerning one's health; menses delayed and scanty; the smell of cooking is unpleasant to her; leucorrhœa after the menses. *Aggravated* in the evening.

Silicia.—Inflammation of the nipples. Phlegmonous inflammation; the breasts are bright red; ill-conditioned pus. Tendency to take cold in the head; she is chilly much of the time. Profuse perspiration at night having an acrid odor. Suppression of the menses; icy coldness at the appearance of the menses; constipation before and during the menses; itching of the vulva, with acrid leucorrhœa. She is hungry but cannot eat; repugnance to cooked or hot food. She desires to be mesmerized. Diseases caused by exposing the back to a draught of air. *Aggravated* in the afternoon and at night, and at the new moon; *relieved* by lying on the painful side, and by warmth.

Spongia t.—Indurations of the breast before the catamenia. Indurations reappearing about a week before menstruation; indurations in the left breast coming in the evening and disappearing the following morning; itching of the breasts; goitre; muscular twitchings; she wakes frequently with a start; glandular swellings on the right side. *Aggravated* at night.

Sulphur.—Sore and cracked nipples, which bleed while nursing; the areolæ are covered with yellowish scabs, from

underneath which there oozes an acrid fluid, causing itching and burning. Inflammation issuing in radii from the nipple; chilliness in the morning, and heat in the afternoon; burning and stinging in the breasts; affections caused by exposure to a current of air; excessive sensitiveness to the open air; the heat of the bed is unbearable; profuse perspiration; unrefreshing sleep; flushes of heat over the body; hungry and weak between eleven and twelve A.M. Urgent desire to urinate; if this is not gratified the urine passes involuntarily; toothache precedes the menses; irritable; scrofulous diathesis; especially useful after *Pulsatilla*. *Aggravated* at night. Left side.

Urtica n.—The breasts are swollen and filled with serum, this changes to a milky fluid; adenoma; sudden suppression of milk; suppression of urine, with œdema; nettle rash which reappears every year at the same time; hemorrhages from the womb, lungs and bowels.

Zincum m.—Painful stitches in the left mamma; aching in the right mamma; she moves her feet constantly; milk suppressed; menses early and profuse, relieving the suffering; she eats very fast; fretful, and dislikes conversation; excessive sensibility of the genital organs. *Aggravated* after dinner and towards evening. Either side.

REPERTORY.

I.—AGGRAVATIONS.

Time, Morning.—Argent. n., Con. m., Formica, Helonias, Iodine, Natr. m., Nux v., Phos., Phos. a., Sepia, Sulph.

Forenoon.—Nux m.

Noon.—Natr. m.

Afternoon.—Bell., Berb., Cimicif. r., Indigo, Lycop., Silicia, Sulph.

Twilight.—Phos.

Evening.—Arnica, Ars., Aster. rub. (*Towards*), Bry., Calc. c., Con. m., Caust., Nux v., Phos., Puls., Rhus tox., Zinc m.

Night.—Acon., Arn., Ars., Brom., Clem., Hepar, Iodine, Lach., Merc., Murex p., Phos. a., Puls., Secale c., Silicia, Sulph.

Before Midnight.—Brom., Bry., Cham., Rhus t.

After Midnight.—Ars., Merc., Nux v., Phos. a.

Air, Cold.—Ars., Cistus c., Clem., Con.

Open.—Baryta c., Caust., Nux m., Nux v.

Either Warm or Cold.—Calc. c.

Bed.—Amm. c., Cham., Sulph.

Rising from.—Bry., Como. den.

Turning in.—Con. m., Nux v.

Climacteric.—Lach.

Coughing.—Caust.

Coffee.—Caust., Cham., Ign., Nux v., Puls., Sulph.

Compression.—Calc. c.

Delivery.—Rhus t.

Excitement.—Calc. c.

Extirpation of Tumor.—Brom.

Eating.—Borax, Carbo v., Cham.
Dinner.—Lactuca v., Plumb., Zinc m.

Flatulence.—Nux m.

Heat.—Apis m., Iodine, Lye., Puls.

Looking Behind.—Con.

Up.—Puls.

Lying on Painful Side.—Iodine, Nux m., Nux v.

Painless Side.—Bry., Caust., Cham., Lach.

Back.—Nux v., Phos.

Left Side.—Baryta c., Brom., Lilium tig.

Right Side.—Lach.

Menstruation.—Caust., Cham., Con. m., Iodine, Merc., Phyto., Puls., Secale c., Silicia, Sulph.

Milk, Drinking.—Brom., Calc. c.

Motion.—Arn., Baryta c., Bry., Sepia.

Moon, Growing.—Clem.

New.—Calc. c., Silicia.

Periodical.—Brom., Merc., Urtica u.

Not.—Apis

Pregnancy.—Carbo a., Cinicif.,
Nux v.

Pressure.—Brom., Carbo a.,
Coty., Lach., Helon. d.

Rest.—Indigo, Lycopod., Rhus t.

Respiration.—Gymnocan.

Riding.—Coty. umb.

Rising.—Gratiola.

from Chair.—Puls.

Room, In.—Iodine, Puls.

Sleep, After.—Lach.

Falling.—Amm. c.,
Lilium, tig.

Side, Right.—Amm. c., Argem.
n., Arn., Ars., Bell.,
Brom., Borax, Bry., Calc.
c., Carbo a., Caust., Coty.
umb., Como. den., Cro-
tal., Formica, Gymnocan.,
Gratiola, Kreos., Lycop-
pod., Murex p., Ol. a.,
Plumb. Phos. a., Rheum,
Sanguin. c.

Left.—Aster. rub., Borax,
Berb., Calc. ox., Clem.,

Como. den., Cinicif., In-
digo, Lilium tig., Merc.,
Nitric a., Phos., Sepia,
Sulph., Zinc m.

Sitting.—Indigo.

Standing.—Ol. a.

Stooping.—Gratiola.

Stretching (Arms).—Argent. n.

Storm, During.—Rhus t.

Suckling.—Borax, Cham., Croton
tig., Nux v., Phyt. d., Puls.,
Sulph.

Stairs, Going up.—Calc. c., Io-
dine.

Touch, From.—Amm. c., Argent.
n., Calc. c., Cham.

Murex p., Sang. c.

Gentle.—Bell., Io-
dine.

Waking.—Calc. c.

Walking.—Coty.

Weather, Damp.—Borax, Calc.
c., Carbo v., Dule., Nux m.,
Rhus t.

II.—AMELIORATIONS.

Air, Open.—Con. m., Natr. m.,
Puls.

Cold.—Bry., Merc., Puls.

Cold, Application of.—Apis m.

Evening (8 or 9).—Lyc.

Legs, crossing them.—Sepia.

Lying on back.—Natr. m.
down.—Arn.

on painful side.—Bry., Sil.

on right side.—Natr. m.

Menstruation, During.—Lach.,
Zinc. m.

Meals, After eating.—Lach.,
Phos.

Motion.—Como. den., Indigo, Ni-
tric a., Rhus. t.

Pressure.—Indigo.

Quiet, From.—Phos.

Riding.—Nitric a.

Rubbing, Gentle.—Indigo, Ol. a.

Sunset, At.—Natr. m.

Sweating.—Cham.

Warmth.—Ars., Con. m., Sil.

Walking.—Con. m.

Water, application of.—Formica

III.—PAINS.

Aching.—Calc. c., Cimicif. r., Coty. umb., Con. m., Zinc. m.

Burning.—Ars., Carbo v., Cicuta, Indigo, Sulph.

Cutting.—Lilium tig., Phos.

Darting.—Gratiola, Murex p.

Direction of pains, Behind forwards.—Ol. a.

Towards the axilla.

—Argent. n.

Upwards.—Kreos., Murex p.

Within outwards.—Berb. v.

Drawing.—Aster., Kreos., Ol. a.

Dull.—Ol. a.

Echymosed, As if the parts were.—Calc. c.

Hammering.—Lach.

Increasing.—Ars.

Knives, As of cutting with.—Hydras.

Lancinating.—Baryta c., Natr. m., Rheum.

Lightning, Flash of.—Sang.

Movable.—Puls.

Needle, As of a dull, thrust into the part.—Kreos.

Paroxysmal.—Cimicif. r., Clem.

Periodical.—Brom., Merc., Urtica u.

Prickling.—Cimicif. r.

Radii, Spreading in.—Bellad., Phyto., Sulph.

Rheumatic.—Crot. tig., Formica, Lactuca, Puls., Rhus tox.

Severe, Very.—Calc. ox.

Sharp.—Como. den., Lilium tig., Murex p.

Shooting.—Bry.

Sticking.—Acon., Bell., Berb. v.

Stinging.—Apis, Indigo, Phos., Secale c., Sepia, Sulph.

Stitching.—Bry., Calc. c., Clem. e., Con. m., Kreos., Murex p., Ol. a., Puls., Sang., Sepia, Zinc. m.

Splinters, As of.—Nitric a.

Tearing.—Baryta c., Cicuta v., Gratiola, Ol. a.

Throbbing.—Bell.

IV.—SUBJECTIVE SYMPTOMS.

Air, Sensitive to.—Calc. c., Sulph.

Bearing down, Uterus.—Sepia.

Burning.—Ars., Berb., Cham., Con. m., Crot. tig., Sang., Sulph.

Coldness, Chilliness.—Calc. c., Kreos., Merc., Rhus tox., Silicia, Sulph.

Constriction, Sensation of.—Borax.

Congestion, Sensation of.—Calc. carb.

Dizziness.—Arg. n.

Drawing, Sensation of.—Aster.

Dryness.—Lyc., Natr. m., Nux v.

Dreams.—Murex p.

Fermentation, Sensation of (Stomach).—Lyc.

Goneness (Stomach).—Sepia.

Hearing, Acute.—Acon.

Heat.—Aster., Bell., Crot. tig., Puls., Sang., Sulph.

Heat, Flushes of.—Hydrastis, Sulph.

Heaviness, Sensation of.—Bell., Bry., Helon., Iodine.

Itching.—Arn., Como., Con. m., Croc. tig., Helon., Sepia, Sil. Sulph.

Lassitude.—Calc. c., Murex p.

Lameness.—Calc. c., Cimicif. r.

Nausea.—Formica, Natr. m.

Numbness.—Rheum., Rhus tox.

Pulsation through the body.—Graph.

Pricking sensation.—Cimicif.

Sensitiveness.—Arnica, Bellad.,

Berb., Con. m., Iodine, Sang., Zinc. m.

Stupid.—Bell.

Sore, Body feels.—Clem., Merc.

Strained sensation.—Calc. c.

Tension.—Argent. n., Puls.

Tension as if surrounded by hot air (head).—Aster.

Vibrations throughout the body.—Clem.

Weakness.—Amm. c., Argent. n., Iodine.

Paralytic.—Ol. a.

V.—OBJECTIVE SYMPTOMS.

Flabbiness.—Iodine, Kreos.

Hardness.—Apis m., Arn., Bell., Bry., Con. m., Merc., Phyt., Plumb.

Inflammation.—Calc. c., Carbo v., Cham., Con. m., Iodine, Phos., Plant. m., Rhus t., Sepia, Sulph.

Inflammation, Absence of.—Badiaga.

Skin, Redness of.—Apis m., Arn., Con. m., Rhus tox., Silicia.

Skin, Dark.—Ars., Hydrast., Nitric a., Secale c.

Excoriation of.—Graph.

in Streaks, Red.—Bell., Phos., Rhus t., Sulph.

White and Tender.—Nux m.,

Swelling.—Apis m., Aster., Baryta c., Bell., Brom., Bry., Calc. c., Carbo v., Cham., Clemat., Con. m., Helon., Iodine, Lyc., Natr. m., Phos., Phyt., Puls.

Spots, like Bee Stings.—Apis, Iodine.

VI.—CONCOMITANT CONDITIONS.

Abdomen.—Calc. c., Coty. u., Lyc.

Abortion.—Cimicif. r.

Anus.—Nitric a.

Appetite.—Rheum.

Arms.—Aster., Comoc. d.

Axillary Glands.—Argent. n., Carbo v., Nitric a.

Back.—Caust., Cimicif. r., Nux v.

Bones.—Phos. a.

Bladder.—Hydrast. c

Bleeding.—Carbo v.

Bowels.—Urtica u.

Breathing.—Amm. c., Calc. c., Kreos.

Catarrh.—Hydrast. c.

Chest.—Berb., Coty. u., Lactuca,
Murex p., Phos.
Chilliness.—Puls.
Coition, Painful.—Natr. m.,
Sepia.
Clairvoyance, State of.—Phos.
Constipation.—Bry., Hydrast. c.,
Nux v., Phy., Sil.
Cough.—Caust., Lycopod., Rhus t.
Diarrhœa.—Crot. tig., Nux m.,
Sang. c.
Engorgement.—Lyc., Phy.
Exhaustion.—Ars., Carbo a.,
Carbo v., Con. m., Phos., Phy.,
Secale c.
Eyes.—Con. m.
Face.—Clem., Graph.
Fingers.—Aster., Ol. a.
Flatulence.—Argent. n., Carbo
v., Lye.
Fissure.—Graph., Natr. m.,
Nitric a.
Gangrene.—Lach.
Genital Organs.—Zinc. m.
Glands.—Badiaga, Brom., Calc.
c., Iodine.
Gums.—Carbo v., Merc.
Head.—Aster., Bell., Brom., For-
mica, Natr. m., Silicia.
Hemorrhage.—Urtica u., Cro-
talis, Secale c.
Hemorrhoids.—Hydrast., Nux v.
Joints.—Caustic, Crot. tig.
Kidneys.—Helonias.
Knots, Hard, in Breast.—Nitric
a., Phos., Phy.
Legs.—Argent. n., Rhus tox.
Leucorrhœa.—Caust., Cham.,
Con. m., Hydrast. c., Iodine, Mu-
rex p., Nitric a., Phos. a., Puls.,
Silicia.
Limbs, Involuntary Starting of.
—Cicuta. v.
Lips, Cracked.—Anm. c., Natr. m.
Lochia.—Carbo a., Rhus tox., Se-
cale c., Sepia.

Lungs.—Urtica u.
Menses, Clots, Black.—Anm. c.,
Bell.
Early.—Anm. c., Indi-
go, Kreos., Ol. a.,
Zinc m.
Early and Profuse.—
Borax, Calc. c., Carbo
v., Caust., Lyc., Mu-
rex p., Nitric a., Phos.
Late.—Natr. m., Puls.,
Sepia.
Painful.—Puls.
Profuse.—Carbo v.,
Sulph.
**Pregnancy, in Third
Month of.**—Kreos.
Scanty.—Baryta c., Nat.
m., Ol. a., Sepia.
Suppressed.—Brom., Ci-
micif. r., Graph., Nux
m., Puls., Silicia.
Milk, Acid.—Puls.
Bitter.—Rheum.
Child Refuses.—Merc
Curdles Easily.—Borax
Flow Prevented.—Graph.
Impossible.—Phyt.
**Sensation as if would
flow.**—Kreos., Puls.
Increased.—Lactuca.
Scanty.—Caust., Formica,
Phos. a., Puls., Secale c.
Suppressed.—Dul., Nux.
m., Urtica u., Zinc. m.
Mouth.—Lyc.
Muscles.—Calc. c.
Neck, Stiffness of.—Ol. a., Puls
Nipples, Aphthous.—Borax.
Areola.—Sulph.
Bleeding.—Borax, Ha-
mam., Lyc., Sulph.
Cracked.—Graph., He-
par, Phyt., Sepia,
Sulph

Nipples, Excoriated. — Arnica,
Caust.

Inflamed.—Silicia.

Itching of.—Arn., Con.
m., Formica, Sulph.

Painful.—Cicuta v.,
Coty. u., Helon., Nux v.

Retracted.—Hydrast. c.

Sore.—Arn., Bell., Calc.
c., Cham., Crot tig.,

Helon., Lye., Merc.,

Sang., Sepia, Sulph.

Ulcerated.—Merc.

Nose.—Lyc.

Nodosities.—Carbo v., Iodine,
Lye., Nitric a., Phyt.

Odor.—Nux m.

Os Coceygis.—Cicuta v.

Ovary, Painful.—Lach., Lilium tig.

Prolapsus Uteri.—Helon. d.,
Lilium tig.

Scalp, Tumor on.—Calc. c.

Sexual Desire, Increased.—Mu-
rex p., Phos.

Diminished.—
Helon.

Shoulders.—Clem., Crot tig.,
Lilium tig., Sang. c., Sepia.

Skin Difficult to Heal.—Borax,
Calc. c.

Cold.—Secale c.

Excoriated.—Graph.

Herpes.—Dulc.

Tetter.—Caust., Hepar.

Sleep.—Con. m., Lilium tig., Nux
m., Puls., Sulph.

Stiffness.—Caust.

Stomach.—Hydrast. c., Sepia.

**Stockings, Feeling as if she had
on Cold.**—Calc. c.

Sweat.—Calc. c., Carbo v., Cham.,
Sepia, Silic., Sulph.

Tongue.—Borax, Cistus c., Natr.
m., Phos., Sulph.

Tonsils.—Baryt. c.

Toothache.—Sulph.

Ulcerations.—Hydrast. c.

Urine, Abundant, Pale.—Coty.,
Lactuca, Ol. a., Phos. a.

Frequent.—Calc. c., Lac-
tucca.

Involuntary.—Borax,
Sulph.

Red Sand.—Lycop.

Suppression of.—Ur-
tica u.

Uterus.—Helon., Hydrast., Lach.,
Lilium tig., Iodine, Murex p.,
Sepia, Urtica u.

Vagina.—Berb., Calc. c., Cham.,
Helon., Hydrast. c., Lye.,
Natr. m.

Vertigo.—Con. m.

Vision.—Phyt.

Vulva.—Carbo v., Helon., Sepia
Silic.

VII.—MENTAL SYMPTOMS AND CONDITIONS.

Air, Desire for.—Carbo v., Se-
cale c.

Alone, Fear of being Left.—
Con. m., Lye.

Anxiety.—Calc. c.

Apprehensive.—Clem., Sepia.

**Concerning One's
Health.**—Lilium
tig.

Changeable Mood.—Nux m.

Cheerful and Inclined to Talk.
—Argent. n.

Depression, Mental.—Apis m.,
Brom., Calc. c., Phos., Puls.

Fear.—Acon., Ars., Zinc m.

Frightened and Easily Startled.
—Calc. c., Borax.

Gloomy.—Natr. m.

Indifference.—Natr. m.
 to one's Relatives.
 —Sep.
Irritable.—Cham., Lactuca v.,
 Sulph.
Laugh, Disposed to.—Nux m.
Malicious Disposition.—Nux v.
Melancholy.—Caust., Cimicif. r.
Mesmerized, Desire to be.—Calc.
 c., Phos., Silic.
Mild, tearful disposition.—Puls.

Misfortune, Foreboding of.—
 Calc. c.
Obstinate.—Calc. c.
Restless.—Cimicif. r.
Sadness.—Clem., Natr. m., Nitric
 a., Ol. an.
Society, Dislikes.—Con. m.
Speaking, Hasty.—Hepar.
Time seems to pass slowly.—
 Argent. n.
Uncovered, Dislike to be.—Clem.
 Hepar s.

VIII.—DISCHARGES.

Aerid.—Carbo a., Carbo v., Con.
 m., Murex p.
Bloody.—Murex p.
Corrosive.—Iodine, Kreos.
Curdy.—Helonias.
Excoriating.—Carbo v., Natr. m.,
 Sepia.
Flesh-colored.—Nitric a.

Green.—Nitric a.
Offensive.—Borax, Carbo a., Carbo
 v., Secale c., Sepia.
Profuse.—Phos. a.
Smarting, Causing.—Cham.
Tenacious.—Hydrast.
Thin.—Secale c.

IX.—FEVER AND CONCOMITANT SYMPTOMS.

Coldness.—Merc.
Chills.—Lach., Phyt.
Fever.—Phyt., Rhus tox.
Puerperal.—Bry.
Heat, Flushes of.—Lach., Sang.,
 Sulph.
Pulse, Hard.—Acon.
 Irregular.—Merc.
 Strong.—Bell.
 Weak.—Ars.

Sweat.—Ars.
 Better after.—Cham.
 Nocturnal.—Graphites,
 Phos.
 Not relieved by.—Merc.
 Sour.—Hepar.
Thirst.—Acon., Ars., Bry., Cistus
 c., Hepar.
 Little.—Bell.
 Without.—Apis, Puls.

X.—NOSOLOGY.

Adenoma.—Argent. n., Baryta c.,
 Con., Graph., Iodine, Lye., Ur-
 tica u.
Atrophy.—Con., Nitric a.

Cancer.—Arn., Ars., Aster., Bell.,
 Calc. o., Clem., Con. m., Silic.
Fibroid tumors.—Ars., Brom.,
 Con. m., Lach., Merc.

Fungous Hæmatodes.—Arsen.,
Carbo a., Clem., Kreos., Sepia,
Zinc. m.

Hypertrophy.—Con. m., Iodine,
Nitric a.

Induration.—Bell., Carbo a.,
Clem., Con. m., Cham., Merc.,
Phos., Sepia, Silic., Sulph.

Inflammation.—Bell., Bry., Carbo
a., Carbo v., Con. m., Hepar s.,
Merc., Phyt., Silicia.

Scirrhus.—Carbo a., Carbo v.,
Chimaphila, Cham., Clem., Con.
m., Hydrast., Staph., Sulph.

Suppuration.—Hepar s., Kreos.,
Merc., Nitric a., Phos., Phyt.,
Silicia.

Ulcerations.—Apis m., Arsen.,
Comoc., Hepar s., Hydrast. c.,
Lach., Merc., Sepia, Silic., Sulph.

XI.—CAUSES.

Air, Back, Exposure of, to.—
Silicia.

Cold.—Cimicif. r., Dulc.,
Formica.

Exposure to.—Sulph.

**Least Draught
of.**—Nux m.

Feet, Getting Wet.—Puls.

Fluids, Loss of.—Phos. a.

Grief.—Cimicif. r.

Injury.—Arn., Con. m., Plant. m.

Mercury, Abuse of.—Hepar s.,
Nitric a.

Nursing.—Bell.

Obstruction to Flow of Milk.—
Cistus c.

Pregnancy.—Sepia.

Sexual Abuse.—Phos. a.

Syphilis.—Merc., Nitric a.

Weaning.—Rhus tox.

XII.—CONSTITUTION AND TEMPERAMENT.

Eyes, Blue.—Brom.

Dark.—Iodine.

Hair, Light.—Brom.

Hysterical.—Con. m., Ignatia,
Lach., Nux m., Puls., Sepia.

Leucophlegmatic.—Calc. c.

Plethoric.—Acon.

Serofulous.—Calc. c., Cistus c.

Slender.—Phos.

Syphilis.—Kreos., Merc., Nitric
a.

Thin, Scrawny Persons.—Se-
cale c.

Unmarried Persons.—Con. m.

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ERRATA.

- Page 2, line 16, read *Meckel* for "*Mickel*."
- " 13, " 9, omit "*and dugong*."
- " 17, " 7, place *comma* after "*artery*."
- " 22, " 12, read *pellicle* for "*pedicle*."
- " 23, " 4, " 0 760 for "0.700."
- " 25, " 4, " 29.87 for "29.81."
- " 26, " 33, " *each* for "*such*."
- " 30, note †, line 2, read *marrow* for "*manure*."
- " 43, " *, read *M. Richerand* for "*Mr. Richeraud*."
- " 50, line 33, " *McImont* for "*McLimont*."
- " 57, note †, line 8, read *the* for "*this*."
- " 64, line 20, after *was* read "*a*," and for *cells*, read "*cell*."
- " 64, " 21, read *tissue cell* for "*cell tissue*."
- " 73, " 23, " *cestoidæ* for "*cestoidal*."
- " 81, " 27, " *pledget* for "*plegget*."
- " 88, " 9, " *determined* for "*positive*."
- " 122, note †, line 6, read *C. F. Heusenger* for "*C. F. Hensenger*."
- " 129, " †, " 6, " *function* for "*formation*."
- " 134, line 13, read *and* for "*one*."
- " 136, " 21, " *Trifol. prat.* for "*Trifol. ignat*."
- " 140, " 17, after *originate* read "*in*."
- " 152, " 31, read *Calc. ox.* for "*Calc. az*."

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